AVIATION

The Oldest American Aeronautical Magazine

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Preparing to Write on the Clouds

VOLUME XIX

NUMBER 25

SPECIAL FEATURES

AN IDEAL FOR AIR RACING

EXPERIENCE IN AIR TRANSPORT

ANNUAL REPORT OF BUREAU OF AERONAUTICS

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DECEMBER 21, 1925

AVIATION

VOL. XIX. NO. 25

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CONTENTS

Editorial 869
Admiral Moffett's Annual Report..... 870
Secretary Wilbur Reports on Naval Aeronautics.. 872
The Annual N.A.C.A. Report..... 873
President Coolidge on Air Defense..... 875
The Lessons of Six Year's Experience in Air Transport 876
An Ideal for Air Racing..... 880
The California "Coupe-Cabin" Plane..... 882
Airports and Airways..... 885

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	85	85

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A Year of Education

ONE OF THE greatest effects of the recent aeronautical hearings, investigations, and trials will be the educational value they have had on those who had to listen to the testimony. The leading officers of the Navy sat for weeks, hearing all sides of aerial problems as they affected the Navy. The Congressmen, who were members of the Lampert Committee, heard all phases of the aviation disputes and the seven volumes of testimony give evidence of the exhaustive scope of its work. The President's Aircraft Board, composed of civilians, covered much new ground, to the extent of four volumes. The nine Generals comprising the Mitchell Court Martial, have had the advantage of listening to an informed cross-examination. The Shenandoah Board has had a more limited field to cover, but, nevertheless, it has had to study the aerostatic development intensively.

Even more important are the educational benefits of these inquiries to the general public. Everyone in the country who takes even a slight interest in governmental affairs, has strong opinions on the air service problems of the Army and Navy. In fact, it may be said that information about the aeronautical activities of the country are better known than the military or naval requirements. With such a background, Congress may be expected to take a greater interest in aeronautical legislation. The country expects it, and no member will wish to return to face his constitutents, without having something constructive to report. It is this fact that makes the outlook hopeful.

Aeronautical Engineering Indigestion

THE REPORT of the National Advisory Committee for Aeronautics lays emphasis, as was to be expected, on the value of engineering to the development of commercial aviation as well as to the military and naval air services. As all engineering work may be properly divided into research and application, it may be well to consider where the art or science stands at the present time. Some very careful students of the trend of aeronautical affairs seem to think that, if care is not exercised, what may be called "aeronautical engineering indigestion" may occur in this important branch of science.

It can readily be seen that if the research progress outstrips the practical application of the laboratory developments, a situation might result which would have unfortunate consequences. One of these is that the knowledge of what is possible, is so far in advance of what is practicable that dissatisfaction may result. Take the case of General Mitchell as an instance. He knows from engineering progress, the great strides that aeronautics could take if money were provided and engineering possibilities were to be incorporated into the art. He tells the public about these future aerial developments and Congress is blamed for lack of funds, the departments are criticized for their backwardness, and the aeronautical industry is looked upon as a laggard. What really is happening is that the progress that has been made in the aeronautical engineering science has far outstripped the practical application. One record or one feat does not establish that high standard as a normal proceedure.

It is a pleasure to note that the work at McCook Field has recently been turned in the direction of making the dreams of the research workers come true. Instead of trying to produce a freak device that will create a sensation for the country, every effort is being made to translate into service types of aircraft and accesories, the knowledge that has been gained in all parts of the world. A careful study of the work being done at the headquarters of the Air Service Engineering Division, gives the impression that it is no longer attempting to concentrate within its borders a monopoly of aeronautical knowledge. Quite a contrary condition seems to prevail. Dissemination of information is the rule now. Every project also has, as its objective, some service purpose. With such a spirit behind the work, it is not improbable that the critics of the past, and AVIATION has been one, will be the first to praise. Perhaps it is easier in this case because the changes may, in part, be due to the elimination of some of the practises complained of. The coming year will prove whether or not the aeronautical engineers can assimilate the great mass of engineering data that has eeb naccumulated since the war, or whether the digestive processes have been overtaxed.

Eliminating the Wilderness

THE brief story of the flying done by Noel Wien, pilot for the Fairbanks Airplane Company,which we published in the airports and airways section of a recent issue is, in itself, of minor importance compared with its foreshadowing of the great change taking place over enormous sections of the world. Just as the automobile is gradually making wider and more remote sections of the country easily accessible to the inhabitants of large cities, so the airplane is gradually making inroads into the wilderness.

There are great acres of land in Northern Canada, Alaska, Mongolia, South America and South Africa, which have rarely been seen, even by explorers. Some of these areas are barren deserts, while other parts contain materials of real value, which could be exploited, provided that men from the surrounding world could penetrate the country. There are also vast stretches of country where wonderful scenery or excellent hunting would attract the sportsman and hunter, were it not for the fact that such places take two or three weeks to reach and few can afford the time.

The commercial flying done from Fairbanks, Alaska, for the past two summers, is a forerunner of an ever increasing amount of flying which will be accomplished in the far outlying corners of the world.

Admiral Moffett's Annual Report

Chief of Bureau Makes Recommendations for the Improvement of Naval Aviation

THE ANNUAL Report of the Chief of the Bureau of Aeronautics to the Secretary of the Navy contains a summary of air operations of the Bureau to June 30, 1925. Below will be found some of the significant parts of the report:

Officer Personnel

During the past fiscal year the shortage of naval aviators has been keenly felt throughout the Navy. The demands of expansion and of increased activities are far in excess of the proportion of qualified personnel gained during this time.

Every effort has been made to increase the familiarity of all officers with the aims and requirements of naval aviation and to encourage volunteers from the younger officers for assignment to this duty.

Despite unusually heavy casualties, a net gain of 54 naval aviators has been made during the past fiscal year (554), but a greater yearly increase is necessary to meet the demands of the service.

Enlisted Personnel

Due to the continued shortage of enlisted personnel which has existed throughout the Navy during the past fiscal year, it has been necessary to continue the operation of 12-plane squadrons instead of expanding to the authorized 18-plane squadrons for the fleet aviation units. Aircraft operations at the various air stations have necessarily been extremely curtailed.

The reduction in enlisted personnel assigned to aviation duties in the past three years is shown in the following table: (4,631 to 3,308)

Flight Operations

The analysis of flight operations shows 104,776 flights, 65,-537 hours, 11 minutes. Of these flights Naval airplanes account for 85,445 flights and the Marine Corps 15,942 flights. Aerostatic flights numbered 3,387 and totaled 1,735 hours, 40 minutes.

The casualties in 63,782 hours show 166 crashes or one crash to each 6,009 hours of flying. There were 32 fatalities, 9 serious injuries and 33 minor injuries.

Training

During the fiscal year a total of 176 officers were under instruction for aviation pilots and three for aviation observers. Of this number 66 qualified as pilots, 25 were still under instruction for pilots, and 3 under instruction for observers at the close of the fiscal year.

One of the outstanding features of the year involving training of personnel for the naval aeronautical organization has been the admission of aviation subjects to the curriculum of the United States Naval Academy. The bureau has assisted wherever possible in furthering the new course in aviation instituted at the United States Naval Academy.

Considerable progress and training has been made in the art of aerial navigation. All air stations and aircraft squadrons have devoted considerable time and energy on this problem.

Effort has been expended along the lines of astronomical observations, running down radio bearings, and flying by dead reckoning.

The training of officers and men in lighter-than-air work has been conducted at the naval air station, Lakehurst, using the U. S. S. *Shenandoah*, the *Los Angeles*, the nonrigid *J1*, and free balloons.

Seven officers have completed training and have been designated naval aviators (airship).

Eleven officers have partially completed training.

Sixteen men completed the course in the Parachute School and were awarded certificates of graduation.

In addition to the above a number of Army officers and men have been trained in lighter-than-air work during the year.

Naval Aviation Reserves

At the beginning of the fiscal year 1925 a great deal of interest had been aroused throughout the country in the Naval Aviation Reserve Force. Hundreds of applications from civilians for aviation training have been received. Due to the limited appropriations for this purpose, training was limited to 60 new students per year and to 188 class 5 and class 6 officers for 15 days' active duty for training.

Training was given at Squantum, Fort Hamilton, N. Y., Great Lakes, Ill., Hampton Roads, Pensacola, San Diego, Lakehurst, and a few with the fleet.

The Aviation Reserve is now allowed a quota of approximately 780 enlisted men.

Material Activities

The Bureau of Aeronautics continued the policy of encouraging design and invention outside the naval service to the fullest extent. The bureau maintains an expert design staff capable of passing upon the designs and inventions submitted, and the closest practicable liaison is maintained with the operating units in order that the bureau may be in a position to indicate to contractors, designers, and inventors the needs of the service. Close liaison is also maintained between the design staffs of the contractors and the Army Air Service.

Procurement of aircraft is normally handled by contract after competitive bidding, and the bureau has endeavored in every reasonable and practicable way to encourage the aircraft trade in order to maintain a proper commercial organization in the United States which will at least form a nucleus for emergency conditions should they arise.

Naval Aircraft Factory

The naval aircraft factory has been maintained in an active but reduced operating status. It continues to be the general base storehouse for all naval aircraft material and is an essential adjunct of the naval aeronautic orgnization. With the reduction of the number of air stations, it has been necessary to utilize the factory for the storage and distribution of material left over as a result of war-time activities, as well as for the storage and distribution of new material purchased. The naval aircraft factory furnishes an establishment where repair, overhaul, and emergency work can be handled promptly without the delay that would be necessary in writing detailed specifications and entering into a contract, the peculiar nature of such work making it impossible to write the specifications and estimate the amount of work involved until the work is well under way. It also carries on the experiments of a confidential nature which must be undertaken under the direction of naval personnel. It is always capable of being utilized for the manufacture of standard aircraft in order to obtain reliable information as to cost. It is essential that such an organization be available in order to safeguard the Government's interests. It is not, however, the policy of the bureau to authorize production orders at the factory under present conditions, as it is the desire of the bureau to allocate such work to the trade. A very small amount of experimental construction, such as the PN9 development, is carried on at the factory. The naval aircraft factory is not used as a factory, but is a naval aircraft establishment engaged in experimental work, repair, and overhaul for the service, and a general storehouse for aviation activities.

During the present year no new aircraft have been constructed at the factory except three experimental planes. A few old planes have been overhauled, modernized, and issued for service.

Rear Admiral William A. Moffett
Chief of Bureau of Aeronautics

Aircraft for the Fleet

The mission of the Bureau of Aeronautics and of its activities is to furnish to the fleet satisfactory types of planes for naval aerial development and use, primarily aboard ship. Fleet aviation requires small and handy combat planes of high performance, to be carried with the fleet; planes for scouting, observation, and spotting gun-fire; torpedo and bombing planes for offensive use against an enemy fleet; and patrol planes of a satisfactory type for use with tenders for coastal and fleet work; this latter type generally precludes their being carried aboard ship, as great radius of action requires planes of dimensions that can not be satisfactorily stowed on shipboard. The development of all types has been pushed vigorously throughout the year, and material progress has been made in obtaining types suitable for the purpose intended.

Simultaneously with the development of special aircraft for fleet work, the problem of carrying these planes with the fleet has received the most careful consideration. It is obvious that aviation can be of greatest assistance to the fleet when it can accompany the fleet to any part of the world. The large flying boats working from harbors and bases on shore have proved serviceable, but in order to carry fighting, spotting, and torpedo planes with the fleet it is necessary either to carry the planes on regular ships of the fleet or on special aircraft carriers. Carrying aircraft on men-of-war involves many problems. One is the necessity for making no serious compromise with the fighting efficiency of the ship, which requires that fleet aircraft be small and compact for stowage on board. It has not only been proved possible but also entirely practicable to launch planes by means of catapults, and the installation of these catapults has been authorized by the department on various types of ships, and most of these installations have already been satisfactorily made; others are under way and the work is proceeding as rapidly as practicable under existing conditions. It is not yet practicable to provide sufficient deck space for planes to return again to the regular ships of the fleet. This

requires that these planes must either be designed as seaplanes to alight on the water or they must alight on the flush deck of an airplane carrier. Work on the *Langley* has shown that this vessel is of great value as an experimental airplane carrier from which much needed data has become available for use in connection with the design and construction of the capital ship airplane carriers authorized by the Congress.

Launching and Arresting

Installation of Type A, Mark I, catapults has been completed on 10 out of 12 battleships and on all scout cruisers (except one of the two catapults for the *Marblehead*). The remaining catapults are ready for installation when the vessels are available. A new type of car for this catapult, capable of launching either the UO1 or TS1 seaplane, has been successfully tried out on the *Mississippi*. A further modification of this car, capable of launching heavier seaplanes, is under construction to be supplied eventually to the Mark I catapults on all battleships. New fighting and two-seated observation planes are under construction for use on Mark I catapults on battleships and scout cruisers.

The first Type P catapult (Mark III) for launching three-seated spotting planes has been installed on a turret of the *Mississippi* and has proved highly successful. Two improved catapults of this type are under construction for the purpose of launching the OL1 amphibian spotter. Other types of three-seated spotters may be launched by furnishing different cars. A universal car will eventually be furnished for this type of catapult. The program of installing catapults of this type on a turret of all battleships will be carried out as funds permit.

A Type P turntable catapult to be known as the Mark V is now under design for use on the new light cruisers and possibly to replace the Type A, Mark I, catapult on battleships.

Experimental work in the development of catapult and arresting gear for aircraft carriers has progressed with the assistance of the U. S. S. *Langley*. The first catapult and the experimental arresting gear unit for the *Lexington* and *Saratoga* have been successfully tested, and the entire gear for these vessels is under construction.

Construction Projects Under Way

2	R-3-C-1	Curtiss, single-seater land or seaplanes, twin float.
9	F-6-C-1	Curtiss single-seater land or seaplanes, single float.
14	FB-1	Boeing single-seater land planes.
5	OL-2	Loening two-seater amphibians.
2	OL-1	Loening three-seater amphibians.
60	UO-1	Vought two-seater convertible seaplanes.
33	SC-1	Martin two-seater, single-engine convertible airplanes.
40	SC-2	Martin two-seater, single-engine convertible airplanes.
1	SC-7	Wright two-seater, single-engine convertible airplane.
3	TB-1	Boeing two-seater, single-engine convertible airplanes.
1	TN-1	Two-seater, twin-engine, convertible airplane.
1	PB-1	Boeing twin-engine flying boat.
2	PN-10	Naval Aircraft Factory twin-engine flying boat.
1	NB-1	Boeing two-seater, convertible airplane.
1	NB-2	Boeing two-seater, convertible airplane.
175	Total	

Aircraft Power Plants

In the past attention has been focused on weight and dependability in power plants. To an extent not paralleled in any other form of transportation the performance and utility of aircraft are limited by the degree of excellence of the power plants available, because the power plant not only propels but also in the case of airplanes is the sole means of support. The power plant is the heart of the airplane. No airplane is better than its power plant. During the past year efforts have been concentrated on refining existing power plants along these lines. In addition, attention has been given economy because economy of fuel determines the range and duration of flight or for a given range influences the weight and thus the performance of the aircraft. Along this line progress has taken two forms—first, improvement in economy of the power plant itself; second, improvement in operation of the airplane as a whole.

Increase in dependability.—Following the lines outlined in the previous report, improvements in dependability of the engine itself have been made. Criticisms and suggestions from the operating units have resulted in changes which have been incorporated in engines under construction and development. Since no engine is better than its accessories, a particular effort has been devoted to improving the dependability of these units. Work along these lines has taken the form of endurance tests, and in this work the services of the aeronautical engine laboratory are invaluable. In general, dependability has been obtained through normal operation at a lower percentage of the maximum power available.

Engine types.—In the water-cooled field proved engines are available up to 800 hp. In the air-cooled field engines are available from 60 to 200 hp. and an experimental 400 hp engine has satisfactorily completed its flight tests. An intermediate size is being built. The water-cooled field has thus been well developed and proved types are available in any power desired for rapid production in cases of emergency. The aircraft-engine industry is so new that standardization is impossible. The bureau is, however, beginning to crystallize its ideas on the basis of engines rated normally at 200, 400, 600, 800, and 1,000 hp., which may be operated at intermediate powers on overload or underload, depending upon the degree of dependability required of the particular service. It is the purpose of the bureau to continue encouraging healthy development of engines by the aircraft-engine industry along the lines indicated. The use of the air-cooled engine with its low weight has forced the water-cooled engine to higher crankshaft speeds. This in turn has focused attention on reduction gears, satisfactory types of which are now available. On the basis of power-plant weight per horsepower, high-speed geared water-cooled engines are comparable with existing air-cooled types and the air-cooled must now improve to retain their superiority.

Parachutes

The past year saw the equipment of all airplane units with parachutes. At the start it was impossible to supply every person entitled to fly with a parachute. Instead, the immediate needs of each station were estimated from its allowance of airplanes and sufficient parachutes were supplied according to a priority list to cover these needs. After the preliminary allowance was distributed, an additional allowance was sent to each station, and it is proposed to increase these allowances again as further parachutes become available.

To date there have been purchased 1,150 parachutes, all but 200 of which have been delivered. These parachutes are sufficient in number to completely equip all the operating units. No parachute is used until it has been dropped experimentally to determine its certainty of action and its strength. The conditions are deliberately made more severe than those likely to be encountered in a service drop, and no parachute is used which behaves in any manner out of the ordinary. This has resulted in the damage and loss of a small number of parachutes, but the practice is justified by the life-saving function parachutes must perform when called upon.

Lighter than Air

Lighter-than-air activities for the year have been restricted chiefly to operations of the rigid airships *Shenandoah* and *Los Angeles*. Inadequacy of helium supply made it impracticable to operate both airships simultaneously and they have therefore been alternated.

The Shenandoah made 10 flights, with a total of 354 hours, 20 minutes, covering a distance of 10,742 miles. The Los Angeles made 15 flights, with a total of 281 hours, 55 minutes, covering a distance of 9,569.

The following long-distance flights are, among others, included in the above figures:

Shenandoah west-coast flight, including six component flights:

Hours of flight	256 hours 16 minutes.
Hours moored	175 hours 43 minutes.
Distance covered	8,091 nautical miles.

Los Angeles:

Bermuda flight	33 hours 16 minutes.
Distance covered	1,359 nautical miles.
Bermuda flight	36 hours 38 minutes.
Hours moored	26 hours 21 minutes.
Distance covered	1,423 nautical miles.
Porto Rico flight, including three component flights—	
Hours of flight	84 hours 31 minutes.
Hours moored	78 hours 2 minutes
Distance covered	3,562 nautical miles.

Not included in the above table is the flight of the *Los Angeles* from Frederichshafen, Germany, to Lakehurst, N. J., 4,229 nautical miles in 81 hours and 2 minutes.

Production of Helium

During the fiscal year 1925 the helium production plant operated continuously and produced 9,511,030 cubic feet of helium, making a total production since the plant began in April, 1925, of 23,927,730 cubic feet. It will be noted that during the past fiscal year there was produced approximately 40 per cent of the total helium produced since the plant went on a production basis in 1921. From this fact it is obvious that great progress was made during the fiscal year toward efficient and consequent economical production. The cost of production in July, 1924, was $62.81 per 1,000 cubic feet and in June, 1925, the cost was $24.05 per 1,000 cubic feet. The results obtained as shown above reflect great credit upon the naval personnel who were engaged in prosecution of the production work.

On March 3, 1925, a law (Public, No. 544, 68th Cong.) was passed transferring the production activities from the Navy Department to the Bureau of Mines, at that time in the Interior Department, but on July 1, 1925, the Bureau of Mines was transferred to the Department of Commerce, so that now the production activities are under the latter department. The production plant at Fort Worth is being operated under the management of civilian engineers, and all naval personnel has been transferred. The Navy, however, will maintain a representative at the plant.

The helium purification plant at the naval air station, Lakehurst, N. J., has been operating successfully during the past fiscal year, repurifying all the helium for the *Shenandoah* and *Los Angeles*. The plant has also repurified approximately 1,000,000 cubic feet of Army helium. The performance of the plant has exceeded the expectations of the bureau.

Use of Surplus War Stock

During the year the value of surplus war stock on hand was reduced to $2,580,000 by use, survey, and sale. This stock has been sorted time and again and the material now remaining is in general of such character that it moves very slowly and a liberal estimate of its actual present value to naval aviation is $259,000.

Conclusion and Recommendation

Naval aviation has continued its efforts to give the fleet sufficient planes of the types necessary to meet naval requirements, and this has been successful to the point where naval aviation is now an integral part of the fleet, accompanying it wherever it goes.

The use of aircraft aboard ships imposes upon the designers of naval aircraft problems not met in the design of other aircraft. The limitations of weight and size are the two outstanding problems to be dealt with. These limitations have been met as far as the engines are concerned by the development of air-cooled engines, which has progressed satisfactorily. The development of metal construction of aircraft is progressing satisfactorily, but has not yet reached a point where it is entirely practicable for production orders.

The design and operation of catapults during the past year has been highly satisfactory.

It is believed that our Navy is the only one which uses catapults to any practical extent. Our development has progressed to a point where planes are now catapulted upon signal from the flagship.

The number of flying hours is increasing yearly, and the bureau is desirous of encouraging as far as practicable a greater increase because it is believed that the more hours our aviators have in the air the more proficient they will be.

The shortage of both commissioned and enlisted personnel has been a handicap during the past year. While it is realized that this has been brought about by the general shortage throughout the service, it is desired to point out that the naval aeronautic organization can not assume its proper place as a balanced arm of the fleet until it has sufficient personnel.

The annual report of the Bureau of Aeronautics would not be complete without an expression of appreciation of the assistance rendered this bureau by the United States Army Air Service, the National Advisory Committee for Aeronautics, the Bureau of Standards, and the Forest Products Laboratory. The heartiest cooperation has existed between this bureau and the agencies named, and their assistance has been of great value and a source of economy to the Government.

In past annual reports this bureau has recommended that the department do everything possible to place upon the statutes of the Government adequate legislation covering civil aviation. I wish to emphasize again the necessity for such legislation if commercial aviation is to make real progress in this country.

While the progress during the year has been reasonably satisfactory, considering the funds appropriated, it must be realized that unless appropriations are increased there can be no material increase in numbers of aircraft, as the appropriations for the last five years have been just about sufficient to purchase planes to meet the normal attrition.

Secretary Wilbur Reports on Naval Aeronautics

THE ANNUAL REPORT of the secretary of the Navy gives certain official statements regarding aeronautical events of the past year which are of the greatest interest. They will be found below:

The "Shenandoah"

The *Shenandoah* was ready for this flight early in July, but after conferences with the Bureau of Aeronautics, and the commanding officer of the *Shenandoah* and upon the latter's recommendation the midwestern trip was postponed, so that during July and August she could operate with the fleet, which she did. In postponing the midwestern flight, the department also acted upon the judgment of Lieutenant Commander Lansdowne as to the relative suitability of weather conditions in the midwest during July, August, and September, as well as the needs of the fleet. During the summer many requests were received by the department to extend the previously announced itinerary of the *Shenandoah* on her midwestern trip to Minneapolis. Efforts to reasonably comply with such requests and the completion of a mooring mast at Dearborn, Mich., made such changes practicable. On August 18, 1925, the Chief of Naval Operations held his final conference with Lieutenant Commander Lansdowne concerning the flight at which time Lieutenant Commander Lansdowne expressed himself as satisfied with the date and arrangements for the flight and expressed entire confidence in the ability of the ship and crew to successfully complete the proposed flight. At this conference Lieutenant Commander Lansdowne was again reminded that in accordance with the established policy of the department he was authorized to defer the trip, change the itinerary, or abandon it altogether if in his judgment such changes were rendered necessary by weather conditions.

About 3 p. m., September 2, the *Shenandoah* commenced her middle western flight on the schedule arranged by Lieutenant Commander Lansdowne in cooperation with the Chief of Naval Operations and the Bureau of Aeronautics. At 5 a. m., September 3, while proceeding through a violent storm, the *Shenandoah* broke in three sections, one section, the nose, landing at Sharon, Noble County, Ohio, and the other two sections, the midship and stern sections, landing at Ava, Ohio. The *Shenandoah* was completely wrecked, and Lieutenant Commander Zachary Lansdowne, her commanding officer, and four officers and nine enlisted men were killed. A court of inquiry ordered by the Secretary of the Navy has been making an exhaustive study of the accident in order to ascertain its causes, and has requested that the Bureau of Standards conduct some 1,500 experiments with portions of the rocovered framework of the *Shenandoah*, to ascertain whether there had been any deterioration of the material, and whether its quality was in accordance with the design. The court is awaiting the result of these experiments before making its report which will be available at the next session of Congress.

The *Shenandoah* during the year had successfully carried out a voyage of over 9,300 statute miles from Lakehurst to Seattle, Wash., via San Diego, remaining away from her shed for a period of over 19 days. This trip gave Lieutenant Commander Lansdowne and his crew great confidence in the ship, and such confidence is manifested in his report on that flight and in an article prepared after that trip and published after his death.

Aviation

Aircraft operating with the other coordinate arms of the fleet are vitally essential to modern naval operations. The development of naval aviation has progressed during the past year with satisfactory results in spite of many difficulties inherent in the refinement of a new art.

Naval aviation is a specialized problem. It involves not only the relatively simple problem of flight operations with aircraft, but also combined with this are the more complex problems of utilizing aircraft under the practical conditions of naval warfare. Planes must be used offensively and defensively in naval maneuvers a thousand or more miles from a land base. They must operate from surface ships and must be closely coordinated with the plans and maneuvers of the fleet organization.

The provision for offensive and defensive use of aircraft along these lines involves problems of stowage, servicing, and repair on surface ships—mechanical details of performance and reliability in operations over water; and above all thorough training of personnel both in the air and on the surface to the end that the fleet may function as a cohesive unit.

The Navy has made every effort to standardize on types of aircraft which are best suited to the needs of the naval service. Planes have been developed and are now in service with the fleet which combine the functions of scouting, bombing, and torpedo launching. Other types have been developed and are in use for observation and spotting service to the battleships and cruisers. Fighting planes will be provided with special reference to the equipment of airplane carriers.

Fleet Maneuvers

Practical training in the tactical use of aircraft in naval operations was afforded by the maneuvers held this year and centering around the Hawaiian Islands. In these operations naval aviation was given an important role. Naval aircraft in the Scouting Fleet and those attached to the naval air station, Pearl Harbor, with other forces of the Army and Navy assigned to the defense of the Hawaiian Islands, carried out extensive scouting operations against the attacking fleet. A total of 130 naval aircraft were engaged in these maneuvers, representing an increase of approximately 20 por cent over the available air strength of the fleet in the previous year. The aircraft attached to the fleet, including those carried on the airplane carrier *Langley*, operated with the surface ships in the attack on the island defenses. The combined operations of aircraft, submarines, and surafce vessels again proved the value of each type and demonstrated the interdependence of these three arms of the Navy. The increased power that is given to a naval force when these three arms have been properly developed and are acting together was clearly proved. The operations of the carrier *Langley* in the fleet maneuvers demonstrated the value of this type and served to emphasize the need of first-line aircraft carriers in major fleet operations.

Avation Instruction at Naval Academy

While aviation has previously been a subject of instruction at the Naval Academy, in pursuance of the above decision a broad expansion has been made in the course at this institution. Early in June a selection was made of 150 members of the class which will graduate in 1926 and they were retained at the Naval Academy instead of taking the practice cruise, and given an intensive three months' course in groundwork and flight training.

Each midshipman was given the regular flight medical examination to determine his individual physical qualifications and so determine his future fitness to be a naval aviator or naval observer. The first two months of the training were devoted to ground work and practical instruction, and the third month each midshipman was given the opportunity for eight hours flying as a passenger. While in the air each midshipman was given supplemental practical instruction in aircraft radio, the use of aerial bombing sights and guns, rules of the road, the use of aerial navigation instruments, and instruction in the handling of planes. A squadron of scouting planes from the fleet was assigned to the Naval Academy for this purpose. Older planes were supplied for engine and rigging instruction in the ground work.

Aircraft Carriers

The *Saratoga* is the first aircraft carrier to be launched for use as a first-line ship with the fleet. The *Lexington*, a sister ship, also was launched during the year. These vessels, with others that may be subsequently provided, will carry an important part of the naval air forces. As a type they may be said to epitomize the interdependence of aircraft and surface craft. In spite of the lack of carrier tonnage the number of aircraft participating in fleet maneuvers has increased each year since the close of the war. The past year has seen a larger number of planes operating with the fleet than ever before and operations of aircraft have been more extended and diversified.

In addition to the extended and increased activity in fleet aviation, the Navy has fostered a number of aviation projects which bespeak the healthy state of progress in design, development, and operation.

MacMillan Arctic Expedition

A naval detail of planes and personnel accompanied the MacMillan Arctic Expedition under the auspices of the National Geographic Society during the past summer. The aviation operations which were conducted as a part of this expedition will furnish valuable information not only from a viewpoint of science and discovery but in the interest of air operations under new and difficult conditions.

In the brief space of time during which air operations were possible the three planes of the expedition flew a total distance of more than 6,000 miles. Practically all of these operations were carried out over the rugged and in many cases uncharted territory of Ellsmere Land. It is estimated that approximately 30,000 square miles of territory were viewed in the course of these operations.

West Coast-Hawaiian Flight

Three planes were detailed for a nonstop flight from San Francisco to Hawaii to take place about September 1, 1925. The planes used were two seaplanes of the *PN9* type and a specially built Boeing plane. The commander, aircraft squadron, Battle Fleet, was placed in direct charge of all arrangements of the flight, and Commander John Rodgers was detailed as flight commander, his flagship being *PN9 No. 1*. The Hawaiian flight was attempted as a practical test of long distance naval patrol planes operated over the water and depending on their own resources.

In order to insure the safety of the aircraft making the flight, the following vessels were placed in line from San Francisco to Hawaii at 200 mile intervals from San Francisco to the westward: *Corry, William Jones, McCawley, Meyer, Doyen, Langley, Reno, Farragut, Aroostook* and *Tanager*. In addition to the above, ships of Submarine Divisions 9 and 14 were placed on a scouting line at Hawaii.

PN9 No. 1 and *PN9 No. 3* left San Francisco about 3 p. m. on August 31. *PB No. 1*, due to engine trouble, remained behind. *PN9 No. 3* was forced down after proceeding 500 miles, due to failure of oil lines. The destroyer *William Jones* located her about 2 a. m., September 1, and towed her back to San Francisco. *PN9 No. 1* proceeded on her way but was forced to land 200 miles from Honolulu, due to lack of fuel. While favorable winds were encountered they were of less intensity than anticipated, and that, together with rain squalls, accounted for the *PN9 No. 1* not having enough fuel to reach her destination. The *PN9 No. 1* failed to reach the *Aroostook*, the nearest station ship, due to a rain squall and to receiving wrong radio bearings.

All available ships were placed on the scouting line to search for the *PN9 No. 1*, and a squadron of destroyers returning from the Australian-New Zealand cruise was ordered to proceed immediately to the Hawaiian area to assist in the search.

Commander Rodgers, after the forced landings of the *PN9 No. 1*, being unable to radio his position and failing to see any of the station ships, was making the best of his way to land, using material from the wings of the plane as sails and improvising leeboards when discovered. The *PN9 No. 1* carried only food and water sufficient for three days; consequently the last few days the crew had little food and only such water as was caught in canvas bags during the rain squalls and what little could be made in a still supplied Commander Rodgers by his mother prior to his departure. After spending nine days at sea Commander Rodgers and his crew succeeded in sailing the plane as a boat to within 15 miles of Nawiliwili Bay, Kauai Island, which they were endeavoring to reach, where they were sighted by the submarine *R4* and towed to port.

Great credit is due to Commander Rodgers and his crew for the fortitude and resourcefulness shown by them in their endeavor to reach land after being forced down.

This flight is another step in advance in the development of material and equipment for naval planes in long-distance work over water.

Three Purpose Plane

The Bureau of Aeronautics during the year has continued development work in an effort to produce a three-service plane available for the new aircraft carriers. Trials have been made of such planes and the bureau reports that by the first of December it will be in a position to determine definitely the exact characteristics of this type of plane to be manufactured for the aircraft carriers. The characteristics of the fighting and observation planes for the carriers have been settled and these planes will soon be under construction. It is believed that in all types of combatant planes very definite results have been achieved during the present year, and it is hoped that, before the conclusion of next year, our experiments will result in a still better type of plane.

The Annual N.A.C.A. Report

THE ELEVENTH Annual Report of the National Advisory Committee for Aeronautics, 1925, was presented to Congress on Dec. 10, and represents a very complete general discussion of Government activities in Aeronautics, together with recommendations.

In his letter of submittal, President Coolidge said, in part:

"The statement of the present status of aviation, as outlined in Part V of the Committee's report, should dispel the impression that America is lagging in the technical development of aircraft for military purposes. Scientific research on the fundamental problems of flight and the collection of results of research conducted in other progressive nations are official duties of the Committee. Their opinion that America is at least abreast of other nations in the technical development of aircraft is commended to the Congress as the most authoritative that can be had. I agree with the Committee that substantial progress in aeronautics is dependent largely upon scientific research. I believe that the work of the committee is the most fundamental activity of the Government in connection with the development of aeronautics and that its continuance is essential if America is to maintain its present advanced position in aircraft development.

"The condition of the aircraft industry and the prospects for the development of commercial aviation on a sound basis have materially improved during the past year. To encourage the development of commercial aviation I wish especially to endorse the recommendation of the Committee for the creation of a Bureau of Air Navigation in the Department of Commerce."

In his letter of transmittal to the President, Dr. Charles D. Walcott, chairman, writes:

During the past year gratifying progress has been made in improving the performance and reliability of aircraft, and the committee's program of continuous scientific research gives promise of maintaining America's advanced position among progressive nations in the technical development of aircraft for military purposes.

Public interest in aeronautics has greatly increased; and confidence in the ultimate success of commercial aviation in America on a sound basis is warranted. A beginning has been made by the letting of contracts by the Post Office Department for air transportation of the mails. In order, however, to hasten the development of commercial aviation on a broad scale, a bureau of air navigation should be created in the Department of Commerce with broad powers.

The condition of the aircraft industry has been substantially improved by the greater volume of Government orders. With sustained Government business and with the prospect of a growing commercial demand for aircraft, the condition of the aircraft industry may be regarded as no longer acute.

While these factors are encouraging and indicate progress toward a healthy development of commercial aviation on a sound basis, the committee desires to emphasize the importance of the scientific work of this committee as the most fundamental activity of the Government in connection with the development of aeronautics, from both a commercial and a military standpoint.

In the following paragraphs, the most significant statements have been extracted from the body of the report:

Aeronautical Research in the United States

The National Advisory Committee for Aeronautics is charged by law with the supervision and direction of the scientific study of the problems of flight, with a view to their practical solution. The committee is authorized by law to direct and conduct research and experiment in aeronautics in such laboratories as may be placed under the direction of the committee. The membership of the committee and of its technical subcommittees is drawn from the governmental agencies concerned and from private life. The members of the main committee and of all subcommittees serve as such without compensation. It is a matter of gratification that since the creation of the committee no person has ever declined an invitation to serve as a member of either the main committee or one of its subcommittees. The committee has therefore been able to draw upon the best talent in America for the study of the fundamental problems of aeronautics, and in this way it has wielded an influence for the advancement of the science of aeronautics that could not have been secured in any other way. This has been done at the direct cost of the Government that involved only the traveling expenses of the members and the maintenance of a place for meetings.

The more fundamental investigations, for which facilities do not exist elsewhere, are undertaken in the committee's own laboratory, known as the Langley Memorial Aeronautical Laboratory, located at Langley Field, Va., on a plot of ground set aside for the purpose by the Secretary of War, and on which the necessary buildings have been erected by the committee with appropriations provided for the purpose by the Congress. Other investigations are assigned, for example, to the Bureau of Standards, to the Forest Products Laboratory, to the Weather Bureau, to the Engineering Division of the Army Air Service, to the Navy, and to various universities having the requisite facilities for the proper study of the particular problems so assigned. This method has proved practical and successful in operation, and has led to the accomplishment of substantial results with a maximum of economy and efficiency.

The committee was created by Congress with the status of an independent Government establishment. It is a service organization, ministering to the needs of the Army, Navy, and Air Mail Service, as well as to the needs of commercial aviation. By virtue of its status, it has been able to initiate and conduct fundamental scientific investigations while at the same time responding to numerous requests from the War and Navy Departments for special investigations in aeronautics.

Relation of Aeronautical Research to National Defense

The relation of aeronautical research to national defense is direct, and its relative importance is increasing. This is necessarily so, because every improvement in the performance of aircraft makes the probable role of aviation in warfare greater. As the relative importance of aviation increases, it becomes more and more desirable for America to achieve and maintain leadership. As leadership cannot be attained in all respects, it becomes of the greatest importance for America to lead in technical development. For ultimate leadership in time of emergency the United States must depend on the results of continuous research and development.

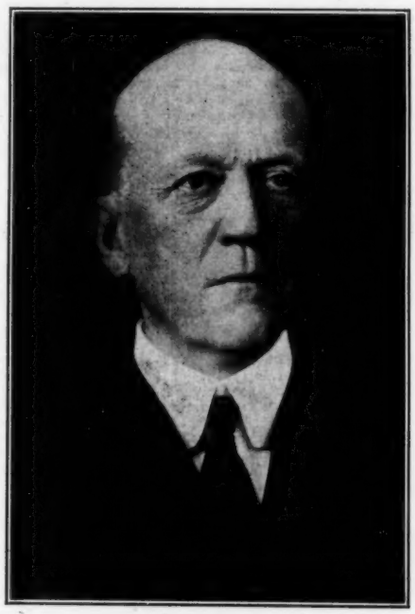
The National Advisory Committee for Aeronautics therefore believes it to be its duty to emphasize the importance of scientific research as the most fundamental activity of the Government in connection with the development of aeronautics. Closely associated with this is the problem of engineering development of aircraft to meet the special needs of the military and naval services.

While the committee is of the opinion that there should be no monopoly of engineering development, either by the Government or by the industry, it believes that it is desirable, in order to secure the best results, that the actual users of military and naval aircraft should be in close touch with competent aeronautical engineers. As a practical proposition, this can be done only if there are such engineers in the Army and Navy Air Services who are in such close touch with the operators that the latter are able to offer to them constructive criticisms in regard to engineering problems. This would enable the aeronautical engineers of the industry to thoroughly understand the problems presented to them and would prevent them from wasting their energies in attempting to develop military types of airplanes which would not meet the requirements of the services.

Without attempting to be specific, the committee is of the opinion that the military and naval services should maintain aeronautical engineering divisions which should be charged primarily with the formulation of specifications of military aircraft, their characteristics and performance; with the critical examination and testing of designs and of aircraft offered by the industry; and with such experimental and development work as can be carried on by them most effectively and most economically.

Investigations

It is to be hoped that the recommendations of investigating bodies will receive careful consideration and lead to a settlement of the controversies in aeronautics that have existed since the war. The continued unrest in aeronautical circles has served to focus attention primarily on organization and administrative matters, but has also indirectly brought about a broader recognition of the increasing relative importance of aircraft for purposes of war and of commerce.



Charles D. Walcott
Chairman of the N.A.C.A.

In the judgment of the National Advisory Committee for Aeronautics, however, the people of the United States are not so much concerned with the form and administration of the Government's activities in aeronautics as they are with the question as to whether practical and efficient results are being secured. It is only fair to say that the best results have not been obtained and will not be obtained as long as the personnel are disturbed and their attention distracted from their real duties. It is most desirable, therefore, that measures to improve the situation be formulated and carried into effect without delay. This will enable all who have the best interests of aeronautics at heart to cooperate and settle down to work in harmony with that full measure of devotion to duty which is necessary to bring about the greatest practicable development of aeronautics in America, for both military and commercial purposes.

Progress in Commercial Aviation

The past year was notable as witnessing what may prove to be a real, substantial beginning of commercial aviation in America. The most encouraging factors were the initiative shown by private companies in establishing air lines and the relatively large number of responsible bidders for the carrying of air mail by contract with the Post Office Department. When it is realized that commercial aviation exists in European countries at this time only by virtue of the support of the various governments given through various plans of direct and indirect subsidies, it should be especially gratifying to all concerned with the advancement of aeronautics, in this country to feel that the era of commercial aviation on a sound basis is about to dawn in America.

Although the National Advisory Committee for Aeronautics has long been of the opinion that commercial aviation must largely make its own

way in America, it believes at the same time that the Government should aid commercial aviation in certain respects where Government aid is practicable and necessary. If, in recognition of this principle, commercial aviation can be successfully developed in America on a firm basis, its development will not be limited, whereas the development of European commercial aviation on a direct subsidy basis is necessarily limited by the nature and extent of the subsidies given. The committee believes that the American policy is sound and in the long run will be more effective in stimulating the substantial development of commercial aviation than will the European policy of direct subsidy.

In spite of this optimistic note, the facts of the situation that must be faced show a number and variety of problems requiring study and solution before commercial aviation can take its proper place in America. The most pressing needs requiring attention at this time are, first, legislation establishing the fundamental right of flight, creating a bureau of air navigation in the Department of Commerce for the regulation and licensing of aircraft, airports, and aviators, and for the establishment, maintenance, and lighting of adequate national airways, and providing for the necessary meteorological information; and, second, the improvement of airplane design and structure with a view primarily to making airplanes safer, more reliable, more controllable at low speeds incident to taking off and landing, and less expensive in initial cost, as well as in the cost of maintenance and operation. There should also be assistance from the other governmental agencies concerned, such as the Hydrographic Office, the Coast and Geodetic Survey, the Weather Bureau, the Lighthouse Service, and the Army and Navy Air Services.

To accomplish the first purpose, legislation is necessary. This has been repeatedly recommended by the National Advisory Committee for Aeronautics and has been indorsed in principle by all agencies of the Government concerned. This question is discussed at length in the report of the committee on civil aviation of the Department of Commerce and American Engineering Council. To accomplish the second purpose requires continuous prosecution of scientific research on the more fundamental problems of flight. This is the definite prescribed function of the National Advisory Committee for Aeronautics, and in the last analysis is necessarily the most fundamental activity in the whole field of aeronautics.

In the past the committee has devoted its attention primarily to the solution of problems arising from the development and use of military and naval types of airplanes and, to a lesser extent, airships. While the basic problems of aerodynamics and of design are the same for military and commercial airplanes, the service requirements as to performance, efficiency, and safety differ. Up to the present time airplanes used for commercial purposes in America have been largely adaptations of military types. This is best evidenced by the fact that the Air Mail Service is still using up war-time DH4 airplanes with certain modifications.

The committee is of the opinion that with the advent of commercial aviation, a new series of problems peculiar to commercial aircraft will be presented. The committee has therefore decided to hold one or more meetings annually with the engineering representatives of aircraft manufacturing and operating industries, with a view to ascertaining definitely the problems deemed of most vital importance and to incorporating the same, as far as practicable, into the general research programs prepared by the committee.

The Problem of the Aircraft Industry

In its tenth annual report, the committee outlined the relation of the aircraft industry to national defense, and emphasized the need of maintaining a satisfactory nucleus of an industry. This was defined as "a number of aircraft manufacturers distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the Government's needs in an emergency." The committee presented certain definite suggestions of steps to be taken by the Government and by the industry to meet the situation that existed at that time. There has been substantial progress during the past year along the lines outlined by the committee, and it is believed that the condition of the industry and the relations of the Government to the industry have been much improved. The greatest single factor in bringing about this improved condition has been the increased volume of Government orders for aircraft, made possible by increased appropriations and contract authorizations for the purchase of aircraft. The present situation, on the whole, may be regarded as more satisfactory at this time, and as offering promise of further improvement.

The Airship Problem

Airships are of three types: Rigid, semirigid, and nonrigid. The value of airships for military or commercial purposes has not as yet been conclusively demonstrated. It cannot be said, however, that they are without value, nor that they have no further possibilities than have already been demonstrated. The fact of the matter is that all types of airships are in the experimental stage of development. The recent regrettable loss of the rigid airship Shenandoah has been urged as a reason for the Government abandoning airship development, or at least rigid airship development, on the theory that rigid airships never will be practicable.

The committee fully appreciates the seriousness of the airship situation and believes that despite all that has been done in many countries to develop airships, they are still rather delicate structures. The conclusions of the naval court of inquiry as to the causes for the destruction of the Shenandoah have not yet been made public. Regardless, however, of the actual technical causes, the committee is of the opinion that it would be a serious error at this time to adopt a policy of merely marking time in the development of airships. In the judgment of the committee, the time has come to decide to do one of two things, viz., either to carry on with the development of airships or to stop altogether.

The development of rigid airships in America for military and naval purposes has, by joint agreement between the War and Navy Departments, been entrusted to the Navy. The question of continuing their development, however, is not altogether a war problem, for airships of all types have probable applications also for commercial purposes. The question, therefore, whether the Navy should continue with the development of rigid airships at this time should not be determined solely upon considerations of their probable naval usefulness. The Army is directly concerned and the commercial development of airships in America may be said to be also at stake. The problem is therefore a national one. Viewed as such, the Navy becomes, in a peculiar sense, the agent of the whole people in the development of rigid airships. In the last analysis, however, it is for the Congress to determine America's policy with regard to continuing the development of airships. As between the two alternatives of carrying on or stopping altogether, the National Advisory Committee for Aeronautics, after careful consideration of the matter, is of the opinion that the development of airships should be continued.

Summary

There has been continued gratifying progress in the technical development of aircraft. Performance and reliability have increased. The committee's program of research for the coming year promises to add substantially to the store of technical knowledge. There is nothing in sight at this time to indicate the probability of the discovery of a revoluntionary principle contributing any great or sudden improvement in aircraft. While progress must be gradual, there is every reason to believe that there will be steady improvement in the performance, efficiency, reliability, and safety of aircraft.

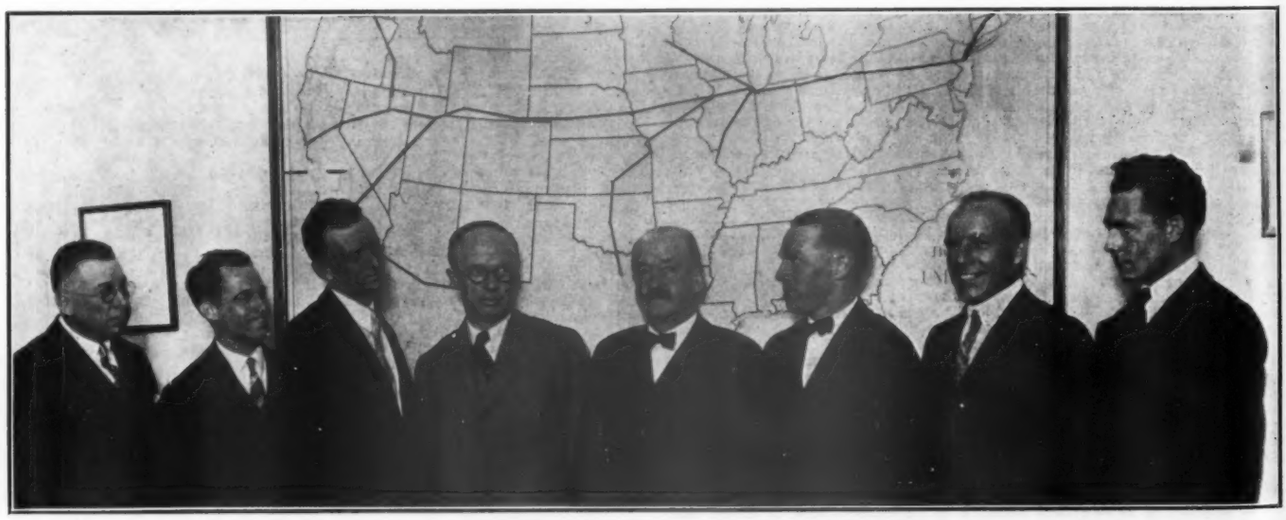
Aviation has become more generally recognized as a weapon indispensable to war operations and as an instrument that gives promise of taking its place in the immediate future in the commercial life of the Nation.

The state of the aircraft industry is gradually improving. The most substantial factors in improving the situation during the past year were the increase in appropriations and contract authorizations for the purchase of aircraft by the War and Navy Departments and the increasingly close liaison between the industry and the Government engineers. With substantial Government patronage on a continuous production basis and with the prospect of a growing commercial demand for aircraft, the condition of the aircraft industry will steadily improve.

Air mail service is no longer a novelty. It is passing out of the experimental stage and becoming a necessity in the daily business life of the Nation. It has reached the point where it has become practicable for private firms to carry air mail under contracts with the Post Office Department. Air transportation of the mails should therefore be extended gradually to meet the requirements of the people in all parts of the country.

Conclusion

The committee is of the opinion that America is at least abreast of other progressive nations in the technical development of aircraft for military purposes. The committee is grateful to the President and to the Congress for the support that has been given to scientific research in aeronautics. The committee feels that the continuous and systematic study and investigation of the basic problems of flight is the most fundamental activity of the Government in connection with the development of aeronautics and that the continuance of this work will serve to keep America at least abreast of other progressive nations in the technical development of aircraft for all purposes.



Contractors For Air Mail Routes

Left to right: Harris M. Hanshue, Pres. & Gen. Mgr., Western Air Express, Inc., Los Angeles, Calif.; Wm. B. Robertson, Pres., Robertson Aircraft Corp., St. Louis, Mo.; Walter T. Varney, San Francisco, Cal.; Col. Paul Henderson, Gen. Mgr., National Air Transport, Inc.; Mr. Varney, Sr., San Francisco, Calif.; E. P. Lott, Manager of Operations, N.A.T.; G. A. Parsons, Colonial Air Lines, Naugatuck, Conn.; Donald Bartlett, Asst. to the Gen. Mgr., N.A.T.

President Coolidge on Air Defense

IN HIS recent message to Congress, at the opening of its Sixty-ninth session, President Coolidge wrote in very broad-minded terms concerning aviation. The whole subject of the nation's air defense is so closely wrapped up with the question of national defense in general, that it has now become difficult to separate one from the other and below is reprinted a complete extract of the President's remarks on national defense.—ED.

Never before in time of peace has our country maintained so large and effective a military force as it now has. The Army, Navy, Marine Corps, National Guard and organized reserves, represent a strength of about 558,400 men. These forces are well trained, well equipped and high in morale.

A sound selective service act, giving broad authority for the mobilization in time of peril, of all the resources of the country, both persons and materials, is needed to perfect our defensive policy in accordance with our ideals of equality. The provision for more suitable housing to be paid for out of funds derived from the sale of excess lands, pending before the last Congress, ought to be brought forward and passed. Reasonable replacements ought to be made to maintain a sufficient ammunition reserve.

The Navy has the full treaty tonnage of capital ships. Work is going forward in modernizing the older ones, building aircraft carriers, additional fleet submarines and fast scout cruisers, but we are carefully avoiding anything that might be construed as a competition in armaments with other nations. The joint Army and Navy maneuvers at Hawaii, followed by the cruise of a full battle fleet to Australia and New Zealand, were successfully carried out. These demonstrations revealed a most satisfactory condition of the ships and the men engaged.

Last year, at my suggestion, the general board of the Navy, made an investigation and report on the relation of aircraft to warships. As a result, authorizations and appropriations were made for more scout cruisers and fleet submarines and for completeing aircraft carriers and equipping them with necessary planes. Additional training in aviation was begun at the Military and Naval Academies. A method of coordination and co-operation of the Army and Navy and the principal aircraft builders, is being perfected. At the suggestion of the Secretaries of War and Navy, I appointed a special board to make a further study of the problem of aircraft.

The report of the Air Board ought to be reassuring to the country, gratifying to the service and satisfactory to the Congress. It is thoroughly complete and represents the mature thought of the best talent in the country. No radical change in organization of the service seems necessary. The Departments of War, Navy and Commerce should each be provided with an additional Assistant Secretary, not necessarily with statutory duties but who would be available, under the direction of the Secretary, to give especial attention to air navigation. We must have an air strength worthy of America. Provision should be made for two additional Brigadier Generals for the Army Air Service. Temporary rank corresponding to their duties should be awarded to active flying officers in both Army and Navy.

Aviation is of great importance, both for national defense and commercial development. We ought to proceed in its improvement by the necessary experiment and investigation. Our country is not behind in this art. It has made records for speed and for the excellence of its planes. It ought to go on maintaining its manufacturing plants capable of rapid production, giving national assistance to the laying out of airways, equipping itself with a moderate number of planes, and keeping an air force trained to the highest efficiency.

While I am a thorough believer in national defense and entirely committed to the policy of adequate preparation, I am just as thoroughly opposed to instigating or participating a policy of competitive armaments. Nor does preparation mean a policy of militarizing. Our people and industries are solicitous for the cause of our country, and have great respect for the Army and Navy and for the uniform worn by the men who stand ready at all times, for our protection, to encounter the dangers and perils necessary to military service, but all of these activities are to be taken, not in behalf of aggression but in behalf of peace. They are the instruments by which we undertake to do our part to promote good will and support stability among all peoples.

Comparative Air Power

An Appendix to the President's Air Board Report.

AIRPLANE STRENGTH UNITED STATES ARMY AIR SERVICE

(a) Status of airplanes on hand June 30, 1925:

Standard—	
Attack planes	0
Bombardment planes	90
Observation planes	249
Pursuit planes	26
Primary training planes	31
Total	396
Substitute for standard—	
Attack planes	0
Bombardment planes	7
Observation planes	520
Pursuit planes	133
Primary training planes	340
Total	1,000
Grand total	1,396

(b) On order but not delivered June 30, 1925:

All-steel observation planes	5
Douglass observation planes	75
Curtiss observation planes	10
Amphibian planes	9
Primary training planes	25
Pursuit planes	45
Total	169

(c) Scheduled for procurement, fiscal year ending June 30, 1926:

Primary training planes	100
Douglass observation planes	35
Pursuit planes	50
Bombardment planes	40
Transport planes	10
Observation (remodeled DH4B's with steel fuselages)	35
Total	270

UNITED STATES NAVAL AIRPLANE STRENGTH, JUNE 30, 1925

(a) On hand

Fit for flight	606
New, not yet conditioned	55
Available for reconditioning in case of national emergency	121
	782
On order	177
Total	959

(b) Composition of the 606 airplanes classified as fit for flight:

Active	218
Reserve	180
Training	163
Experimental	45
	606

(c) Airplanes classified as active and reserve (service airplanes) stated by types.

	Active	*Reserve*	*Total*
Scouting	12	6)	90
Torpedo and bombing	48	24)	
Observation	80	91	171
Fighting	42	18	60
Patrol	36	41	77
	218	180	398

Service airplane strength of the United States, Great Britain, France, Italy and Japan.

June 30, 1925, United States, service and reserve excluding training.	*Apr. 1, 1925, Great Britain, service and reserve excluding training.*	*Jan. 5, 1925, France, excluding Service.*	*Reserve.*	*Apr. 1, 1925, Italy, including Service.*	*Reserve.*	*June 30, 1925, Japan, Service reserve, including training.*
Army, 1,025) 1,423	1,053	1,542	4,000	750	750	1,300
Navy, 398)						

AIR SERVICE PERSONNEL OF THE UNITED STATES, GREAT BRITAIN, FRANCE, ITALY AND JAPAN.

		United States. June 30, 1925.	*Gt. Britain. Apr. 1, '25.*	*France. Jan. 5, '25.*	*Italy. Apr. 1, '25.*	*Japan. June 30, '25.*
Officers	Army 938					
	Navy 706	1,644	2,282	1,974	753	983
Cadets		....	115	....	....	....
Warrant officers		....	292	....	....	....
Enlisted men	Army 9,063					
	Navy 4,141	13,204	26,561	34,812	10,657	6,853
Total		14,848	32,656	36,286	11,410	7,836
Pilots	Army 835					
	Navy *638	1,473	2,145	3,184	921	774

*Includes Marine Corps.

The Lessons of Six Year's Experience in Air Transport

The Possibilities of Economic Operations Discussed by General Brancker Before the Royal Aeronautical Society

Last week, AVIATION *printed a general resumé of the main points brought out in the presidential address before the Royal Aeronautical Society of Major General Sir Sefton Brancker, on the subject of Air Transport. Owing to the significance of General Brancker's observations, it has been impossible to condense his remarks except in a very limited degree and the resumé is continued in the following columns, in which are brought out General Brancker's remarks on economic operation of air transport. General Brancker, Director of Civil Aviation in the British Air Ministry, deals with, not only the actual costs of operation, but also the numerous technical developments which will, directly or indirectly, influence and further reduce operating costs and result in extended possibilities in economic air transport.*—EDITOR.

GENERAL BRANCKER, discussing the numerous aspects of economy, expresses the view that transport, by airplanes or by seaplanes would always be expensive compared with transport by surface means. He bases this view on the fact that trains, ships, and even airships, maintain themselves in their own particular medium without expenditure of energy for this purpose, leaving their whole available horsepower for purposes of propulsion. This is not the case in airplanes and seaplanes which necessarily expend a portion of their available power in lifting their own dead weight.

General Brancker then proceeds to ennumerate the chief items of cost in operation as apart from those of administration, and to elaborate on each of these, indicating how technical progress will be instrumental in bringing down such costs.

"The most important items of expenditure on the actual operation of any service are as follows:—

(*a*) Cost of fuel and oil.
(*b*) Pilots' and mechanics' flying pay.
(*c*) Engine maintenance and overhauls (man-hours and spares).
(*d*) Airplane maintenance and overhauls (man-hours and spares).

Fuel and Oil Costs

"(*a*) Fuel and oil at present account for about 30 per cent of these operating costs—a very big item indeed; as an example, a standard W8 Handley-Page expends more than tenpence (20 cents) a ton-mile on petrol and oil.

"On the other hand, we have made very great progress towards the production of an engine burning heavy oil with a total weight per horsepower not seriously exceeding the modern petrol engine. The extra weight of this engine is compensated for by the fact that the actual weight of the fuel consumed per horsepower promises to be something approaching 20 per cent less than that of the petrol burned in existing engines. Here indeed is a step in the right direction, the cost of heavy oil can, I suppose, be assessed at about one fifth of that of petrol; so we see that in an aircraft of similar horsepower and qualities as the Handley-Page, about eightpence per ton-mile could be saved by the fitting of heavy oil engines. Heavy oil has its drawbacks; it is dirty and it creeps; but I think that these defects can be combatted and with such a saving in their fuel bills in prospect it is hardly possible for operating companies to refuse it a trial. Fortunately the airship scheme covers considerable expenditure towards the development of heavy oil engines and the result of these researches and experiments will be of great value to the operators of heavier-than-air craft.

"The adoption of heavy oil fuel would almost certainly necessitate the use of all-metal aircraft; wood and fabric would be too susceptible to the creeping tendencies of heavy oil.

"(*b*) The cost of pilots' and mechanics' flying pay is a comparatively small item, but is worthy of consideration. The rate to-day is, I believe, 10 shillings ($2.40) an hour; the equivalent of 1¼ d. to 1½ d. (2½ to 3 cents) a mile according to the speed of the aircraft.

"This rate was based on the numbers of hours flying per annum that it was considered fair and safe to demand from the pilot in order that he might earn a rair wage. As aircraft improve in stability and ease of handling, and as power plants become really reliable, the strain of piloting will be reduced and the time spent in the air can be increased. Pilots to-day are flying as much as 135 hours in a month during the summer without adversely affecting their health, and I think the highest total attained in ten months' operation by an individual pilot last year was 650 hours. As conditions improve, these hours will undoubtedly be lengthened considerably. How rates will adjust themselves I do not pretend to know, but increased hours of work must lead to economy in operating costs.

Engine Maintenance

"(*c*) The next item of operational costs, the maintenance and overhaul of engines, is the biggest of all. It represents about 44 per cent of the total of the items given in the list above. Maintenance and overhaul are very closely inter-related; it is not only necessary to assess the maximum number of hours an engine can be run with safety; there is also a maximum number of hours after which the cost of overhaul rises out of all proportion to the extra hours flown.

"A glance at the percentage of incidence of the four main items of expenditure in operation will disclose the fact that the cost of operation varies directly with the horsepower of the power plant. Seventy-four per cent of the total cost can be attributed to the maintenance and the fuel consumption of the engines; further, the capital value of engines and of most normal commercial aircraft are closely related to the horsepower employed, which again extends its influence to depreciation and insurance. It is for this reason that the contract with Imperial Airways for the European services has been modified from a purely mileage basis to a horsepower mile basis.

Increasing Pay Load

"If we accept my plea that operational costs are directly proportionate to the horsepower employed, two problems present themselves to the designer in his struggle toward producing a really economic aircraft.

(i.) How can he carry more total weight per horsepower than is the practice to-day?
(ii.) How can he improve the ratio of the weight of paying load to the total weight of the aircraft?

"To commence from actual facts, the existing standard commercial machines give us the following results:—

Type	*Horsepower.*	*Total weight per sq. foot. (lbs.)*	*Total weight per horsepower (lbs.)*	*Paying load per horsepower. (lbs.)*
De Haviland 34	440	13.5	16.4	3.1
Handley-Page W8	710	8.6	17.6	3.85
Supermarine Sea Eagle	365	9.95	16.6	2.19

"It is on these figures that we must endeavor to make a definite improvement.

"First, how can a greater total weight per horsepower be carried with safety? In approaching this problem, it must be realized that the basic difficulty is not to fly with a greater weight, but to leave the ground safely under the various adverse conditions of atmosphere and soil which present themselves in practical operations. For instance, the DH34 probably expends something between 450 and 480 horsepower in its initial take off, whereas it cruises comfortably at 95 m.p.h. with only about 350 horsepower. With this factor in mind the following solutions present themselves:—

(a) Increased wing area.
(b) A good climbing wing section.
(c) The employment of flaps, slots and other similar devices.
(d) The introduction of variable pitch propellers.
(e) The "ground boosting" of engines.

Entering upon each of these points in turn, the writer points out that increased wing area will spell reduced speed, a factor which is important in commercial aviation, not only in itself but also since, given a fixed horsepower, the faster a journey is accomplished, the less it will cost per mile, since the items of fuel consumption, maintenance, flying pay, radio and probably insurance per mile, are all reduced, and reliability and punctuality are enhanced. It is estimated that a cruising speed of 100 m.p.h. is necessary for normal conditions.

Flaps and Slots

On the employment of flaps and slots, General Brancker expresses favorable opinion. With the intimation that five commercial planes are shortly to be equipped with slotted flaps, comes the possibility of some really valuable data upon this controversial point.

As the final point, that of the "ground-boosting" of engines, the author writes:

"Next comes the development of so-called ground-boosted engines. By this means, without appreciably increasing the weight of the power plant, a very much increased horsepower can be obtained during the initial climb; to get the best out of this system a variable pitch propeller is necessary. I have heard various figures, ranging from 25 per cent to 50 per cent, mentioned as the measure of the gain in horsepower. The employment of these two latter developments does not bring with it the advantages of a slow take off speed and a low stalling speed—but combined with the fitting of flaps and slots, and perhaps an improved wing section, a very great improvement in the total weight carried per horsepower should be possible without danger. With all these developments I do not see why a total increase of 25 to 30 per cent should not be possible in the near future; in other words, we should be able to design even now an aircraft cruising at 100m.p.h. and weighing fully loaded 25 lb./hp., which will be safe and easy to fly."

The Commercial Seaplane

With the bringing to a close of a brief discussion of numerous points relating to detail design and the possibilities in increasing pay load by means of reduced fuel consumption, General Brancker refers to the possibilities of the seaplane as a commercial air carrier.

"An inspection of Table 4 reveals the fact that the paying load ratio of the small flying boat is exceedingly bad. On the other hand, some of our leading designers hold the view that the really big flying boat or seaplane (perhaps 2,000 horsepower and above) will work out to be lighter than the airplane and will give in consequence a better ratio of paying load. A most interesting and valuable scientific investigation at the present moment would be an endeavor to assess the most efficient size for an airplane and a flying boat; there must be some point at which the ratio of paying load to total loaded weight must be at its highest, but so far as I know, we have not any notion as to where this point lies, although it is often stated that there is a size above which the structural weight increases out of proportion to the disposable load.

"As a scientific problem, however, I ought to ask for the size of the aircraft which will give the highest possible ratio of useful load (including crew, instruments, fuel and paying load) to total weight of structure and power plant."

Reviewing the possibilities of increasing the paying load per horsepower, the following important technical developments are indicated as necessary:

(i) The development of slow-flying aircraft with the greatest possible carrying capacity for the transport of goods.
(ii) Further investigation and experiment in the qualities of the thick-winged aircraft both in wood and metal.
(iii) Very full investigation and experiment into the combination of flaps, slots, the ground-boosted engine and the variable-pitch propeller.
(iv) Scientific investigation into the optimum size of aircraft for economic results.

General Brancker continues to a brief discussion of the comfort of passengers traveling by air. It is pointed out that while comfort is at present very well taken care of in European airlines, the problem of air sickness and noise are still unsolved. While these problems must eventually be attacked at their origin, namely in silencing the propeller and reducing the engine exhaust noises, the minor problems, such as preventing reverberation and drumming in the cabin and producing a more or less sound-proof cabin, are of great importance at the moment.

Having dwelt at some length upon the lines of improvement necessary, the writer proceeds to sum up the lines of progress which are most important and urgent. The production of an unfailing power plant is placed first in importance, while generally improved reliability of engines and an appreciable increase in the life between overhauls, follows as a possibility of the immediate future. The possibility includes, of course, the use of two or more engines, bearing in mind that the single engine offers the best aerodynamic arrangement. Next, General Brancker places the all important problem of obtaining greater stability and increased ease of handling, at the same time increasing the measure of lift by means of the various auxiliary wing devices. These will increase safety, reliability, and paying load, even though cost of maintenance may suffer.

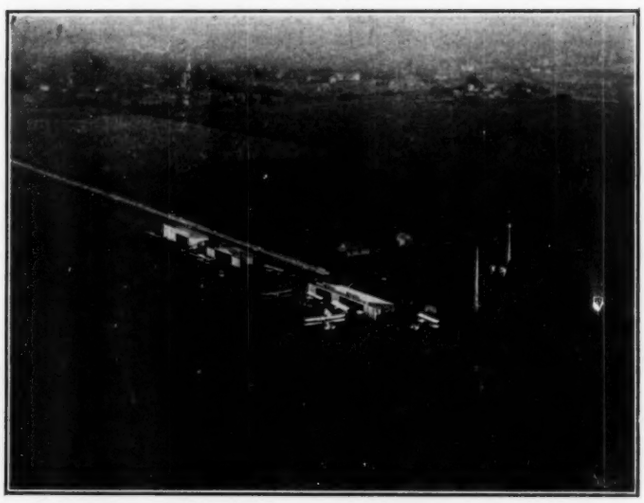
The further development of all-metal construction particularly in connection with the thick-wing type, is put up as the next in importance of necessary lines of improvement. This feature will not only tend toward greater safety, economy and reliability, but economy in maintenance will also be reduced by metal-construction.

Heavy Oil Engines

Finally, mention is made of the development of the heavy-oil engine for use in airplanes. Its advent will, in addition to safety, etc. represent a great saving in the cost of fuel and consequently, the cost of operation.

In an endeavor to approximate just what measure of reduction of costs the successful accomplishment of some of these technical objectives might mean, General Brancker enters into a very enlightening discussion.

"I will take as my basic factor a standard aircraft closely approximating to one of those operating to-day.



An air view of Monmouth Field, Ill. The Air Mail hangar and planes may be seen in the foreground with the two hangars belonging to the Mid West Corp. and planes in the distance

"This aircraft carries a total load of 18 lb./hp., of which only 3.5 lb./hp. represents paying load. Its cruising speed is 85 m.p.h. and its endurance about 4½ hours. Its cost of operation, including only fuel, maintenance and overhaul, flying pay and wireless, is 3/- ($0.73) a ton-mile. These figures are not exact statistics, but they are based on experience and can be guaranteed as a reliable standard of existing conditions.

"In addition, I will assess overhead charges, including insurance and depreciation, at 2/- ($0.49) a ton-mile. This is an imaginary figure, but is, I think, sufficiently high. We have therefore a total cost of 5/- ($1.21) a ton-mile.

"Let us examine our costs of operation first. Earlier

on in this paper I have indicated that they are divided as follows:—

Fuel and oil	30 per cent
Maintenance and overhaul of engines	44 per cent
Maintenance and overhaul of aircraft	20 per cent
Miscellaneous	6 per cent
	100 per cent

"If some of the improvements I have outlined come about, I can see no reason why the fuel bill should not be reduced to one-fifth; engine maintenance to one-half; and aircraft maintenance to three-quarters, of their present figures. This would result in a saving in operational costs of more than 50 per cent.

The cost of operating the standard aircraft at once drops to 1/6 ($0.36) a ton-mile, without overhead charges.

"Next I have visualized the possibilities of increasing the total load carried per horsepower. Let us suppose that we attain 24 lb./hp.; this does not seem an outrageous supposition considering what has been done experimentally and taking credit for the various new developments already in progress. This increase of one-third to the carrying power would give us, other things being equal, a paying load one-third greater for the same cost of operation, *i. e.*, 1⅓ ton-miles for 1/6 ($0.36), or 1/1½ ($0.27) a ton-mile.

"Finally, let us imagine the ratio of paying load to total load to be increased, as seems certain in the future. The ratio in the standard aircraft is approximately one-fifth; let us imagine this increased to one-fourth, *i. e.*, 6 lb./hp. instead of 3.5 lb.; a little arithmetic shows that the cost per ton-mile will then fall to 10½d. ($0.21).

"The overhead charges must also decrease. As safety and reliability increase, insurance and depreciation will drop steeply; in addition, this same enhanced measure of safety and reliability will give a great impulse to the already growing traffic, which in its turn will lower the incidence of the remaining overheads on the ton-mile. A reduction of 50 per cent, *i. e.*, from 2/- to 1/- ($0.49 to $0.25) a ton-mile, would not be an exaggerated estimate even in the early stages of improvement.

"The final result of these calculations is that a rate of 1/10½ ($0.45) a ton-mile at 85 m.p.h. cannot be considered out of reach even with the developments we have in view to-day. The higher cruising speed of 100 m.p.h. and the increase in the capital value of the fleet necessitated by the adoption of metal aircraft will throw up expenses somewhat, but even allowing as much as 4½d. ($0.09) a ton-mile for these items, we reach the result of 2/3 ($0.55) a ton-mile at 100 m.p.h. including all costs."

It is only right to add that General Brancker, in putting forward predictions, points out that he does not consider them vague or unreliable, pointing out that while some of the claims may be optimistic, others will certainly prove too conservative.

With a view to developing commercial aircraft along prescribed lines, the British Government set specifications for certain types of airliners and gave orders for certain machines. The specifications were drawn up in 1922 and the following, extracted from General Brancker's paper, are the three specifications:

"(i) An improved "cross-Channel" machine cruising at 100 m.p.h. and carrying 5 lb. of paying load per horsepower. This specification was an endeavor to produce a machine which could carry its load at a cheaper rate per ton-mile than is possible at present.

"(ii) A "Middle East" machine fitted with three air-cooled engines and capable of flying 500 miles against a 30 m.p.h. wind. Paying load as great as possible. The specification was dictated by the conditions prevailing in Iraq and the Persian Gulf.

"(iii) An "Imperial Communication" machine, fitted with three engines and capable of reaching Malta without refueling. It was hoped that such an aircraft could reach Australia by an "All-Red" air route."

Orders, it is stated, have been placed for (i) and (ii) while specification (iii) proved too difficult to accomplish, for though a machine of the range called for, could have been produced, its pay load would have been too small for practical purposes. The DeHaviland 54 is the first plane built under specification (i) and it is pointed out that, while this plane cannot carry quite 5 lb./hp. its pay load comes very near it. The plane has automatic wing flaps and a Rolls Royce "Condor" engine.

The Three Engine Type

The first representative of specification (ii) is the Siddeley-Armstrong "Argosy" which is now under construction. She is fitted with three air-cooled radial engines and is partly of metal construction.

At a later date three more specifications were put up by the Air Ministry, for which airplanes have all been ordered or are about to be ordered:

"(iv) A flying boat with two air-cooled engines totalling about 500 hp. The specification was based on the demand for a small flying boat for pioneer work and short-distance services in various parts of the world, cheapness in original cost and maintenance being of great importance. 500 hp. is considered to be about the lowest possible for a really airworthy boat with an appreciable paying load, and the two-engine system has certain obvious advantages in the design of flying boats.

"(v) A large passenger-carrying flying boat with three engines capable of flying 500 miles against a 30 mile wind. This is intended to meet the conditions existing on the Calcutta-Rangoon service or some similar route over water.

"(vi) A freight-carrying aircraft to carry about 9 lb. of paying load per horsepower for 4½ hours. The anticipated cruising speed of this machine is from 60 to 65 m.p.h. This specification was dictated by a desire to discover what is the greatest total load per horsepower that can be carried on a regular freight service."

All Metal Commercial Planes

In addition to it, the writer announces that two all-metal twin-engine flying boats and a very large all-metal three-engine airplane are on order. Further specifications are under preparation for a high speed mail plane, a survey machine and a "cheap maintenance" airplane, which, it is hoped will be of all-metal construction.

Cleveland Air Mail field by night. The glow of the B.B.T. flood light can be seen across the field, though the light itself is not visible in the picture

General Brancker concludes his paper with a brief resume of the respective subsidy systems of the four major air transport countries. The table below is of extreme interest purely as a comparison of the amount financially put into the civil and commercial operation of airplanes by these countries.

Country	Direct Subsidies or State Service in case of U.S.A.	Miles flown on regular Service.	Passengers Carried.	Freight and mail carried. (Tons.)
Great Britain	£131,500	825,000	13,500	507
France	£521,356	2,249,000	16,277	1,515
Germany	£245,000	2,562,866 (2,100,000)	57,911	274
U.S.A.	£597,826	1,853,251	—	60 million letters.

(Note the miles flown and passengers carried by Germany include joy-riding).

Concluding Remarks

In conclusion, General Brancker writes, in part:

"I am convinced of two facts: first that we cannot attain commercial success without considerable further technical progress, and secondly that we cannot ensure this technical progress without a growing body of operational experience. The operator and the designer therefore must advance side by side in full co-operation; and it was with a view to assisting in this co-operation that I wrote this paper."

The appended tables are extremely significant.

TABLE 1.
ACCIDENTS IN BRITISH AIR TRANSPORT SINCE AUGUST, 1919.

Cause of Accident.	Fatal.	Dangerous though not fatal.	Total.
Error of judgment	2	1	3
Power plant failure leading to error of judgment	1	1	2
Bad weather leading to error of judgment	1	1	2
Collision owing to error of judgment	—	1	1
Power plant failure	—	2	2
Collision	1	—	1
Faulty compass	—	1	1
Totals	5	7	12

TABLE 2.
ENGINES REMOVED OWING TO DEFECT BEFORE RECOGNIZED OVERHAUL DATE.

Defect necessitating removal.	Percentage of the whole.
Water system 28% Valve breakage or distortion 19% Oil circulation 10%	= 57%
Failures of material, *e.g.*, cracked crank cases, broken housings and casings, etc.	— 23%
Miscellaneous and indefinite defects	— 20%
Total	100%

N.B.—Of all these failures, only 7 per cent were so serious as to cause an immediate stoppage of the engine, and two cases only relate to single-engined machines; of this 7 per cent there was only one case of a broken connecting rod and three cases of breakage in the reduction gear.

TABLE 3.
ANALYSIS OF OPERATIONAL COSTS OF STANDARD BRITISH COMMERCIAL AIRCRAFT.

Fuel and oil	30%
Maintenance and overhaul of engines	44%
Maintenance and overhaul of aircraft	20%
Miscellaneous	6%
	100%

TABLE 4.
STANDARD BRITISH AIRCRAFT.

Type of Machine.	Horse-power	Total weight per sq. ft. (lb.).	Total weight per hp. (lb.)	Paying load per hp. (lb.).
DeHaviland 34	440	13.5	16.4	3.1
Handley Page W8	710	8.6	17.6	3.85
Supermarine Sea Eagle	365	9.95	16.6	2.19

Aerial Photos as Transit Aids

For the first time in the history of transit hearings, airplane photographs were introduced in evidence in New York at the final hearing before James B. Walker, Secretary of the Transit Commission, on the proposal to establish additional service on the Nostrand Avenue surface line in Brooklyn, between Avenue Q and Avenue U.

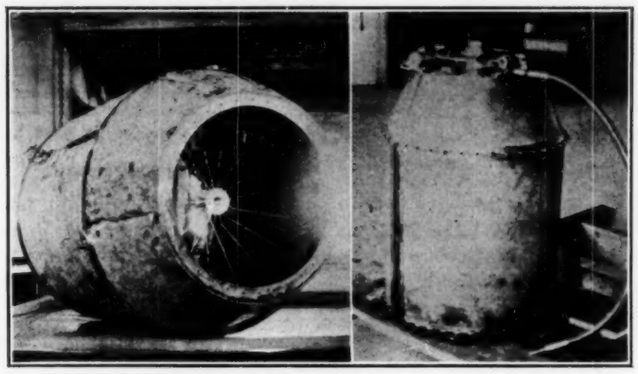
Three airplane photographs of the sections affected were presented by S. B. Olney, counsel for the Coney Island & Grevesend Railway Co., and Harry Sefton, counsel for the Brooklyn City Railway Co., in an attempt to show that it was too sparsely settled to justify the additional service.

The photographs were taken by E. E. Dickson, photographer for the Fairchild Aerial Camera Corp., at a height of 11,000 ft. Mr. Walker said he would announce his decision later after study of the evidence in this and preceding hearings.

The Pescara Bullet-Proof Tank

The purchase, by the War Department, of two bullet-proof and leak-proof airplane gasoline tanks, invented by Mario Garagnani dei Pescara, a well known Italian Ace and brother of the Marquis Pescara, who invented the helicopter plane used by the French Government, is reported by the Inventors' International Institute.

The tank, which was tested by the War Department at McCook Field, Dayton, Ohio, is declared to provide the means for the partial elimination of fire in airplanes. In addition to being bullet-proof and leak-proof, the tank is detachable so that, in the event of a forced landing, it may be dropped before the plane reaches ground.



Two views of the Pescara bullet-proof tank

The Pescara tank operates by means of two rotating cylinders, one within the other, which form the walls of the tank. When the cylinders are pierced, mechanism moves the inner cylinder around, approximately four inches, so that the holes in each cylinder are covered by the walls of the other. In the Government tests, in charge of Lieut. R. G. Dykeman, although the tank was pierced repeatedly by .50 caliber machine gun bullets, none of the contents leaked out. In his official report Lieutenant Dykeman pointed out that the Pescara tank is about 40% lighter in weight than any other so-called bullet-proof tank.

Limitation of the Number of Records

The folowing is of great importance to all aviators who wish to make records between now and the first of July, 1926:

A reform, proposed at the Congress of Prague, by M. Paul Tissandier, Vice-President of the Aero Club of France and Secretary-General of the Federation Aeronautique Internationale stipulates that:

> Beside the record of pure speed, the other official speed records have reference only to five possible distances: 100, 500, 1000, 2000 and 5000 km.
>
> The records with useful load will apply only to flights with 500, 1000, 2000 and 4000 kg.
>
> Beside the record of distance in a straight line, a newcomer appears, namely, the record of the heaviest useful load permitting an altitude of 2000 m.
>
> Finally, in the case of refueling in flight, only records of distance and duration will be recognized.

With this regulation, records of airplanes are reduced from 564 to 45.

Records pertaining to airships and spherical balloons remain unchanged. These are less numerous, numbering, respectively, 16 and 27.

For gliders, without engines, the number of records has been dropped from 28 to 5. Lastly, the records of helicopters are reduced to 29 in place of 140, in spite of the fact that cognizance has been taken of speed up to 500 km. and useful weight up to one ton.

In short, the new regime recognizes 168 records in place of 1339. However, as these conditions will only take effect on the first of July, 1926, it is expected that for the next half year, a strife all the hotter will ensue, since, in many cases, the conquerors will be the final holders.

An Ideal For Air Racing

The Ford Tour Idea Commended and German Rundflug Cited as an Example

By EDMOND T. ALLEN

THE GREATEST airplane race of the year, the *Deutsche "Rundflug"*, which took place in Germany during the summer, was from many points of view, the most remarkable single aeronautical event since the war. Conceived and carried out by the German Aero Club under the cramped conditions allowed by the Versailles Treaty, it demonstrated what could be done under great difficulties, by a persistent faith in aviation.

Perhaps the most fortunate thing that could have occurred to German aviation, was the Interallied restrictions placed upon engine size for planes built in Germany following the war. With all their old war planes given up and all their energy directed toward flight without power and then flight with very low power, Germany started again with a clean slate. The engine size limitation has gradually been increased, until at present the limit is 120 hp. This has had the effect of producing, at each stage of power allowance, the greatest possible performance. It has been an impetus rather than a damper to aeronautical interest and enthusiasm in Germany. Technical schools are full of students, who, as boys, gave their pennies to build, perhaps, a new commercial airship when Count Zeppelin was financially broken; who, as high school students, built models in national competitions, and who, as college men, are now going in earnestly for aerodynamics. The German aeronautical industry has absorbed a few of these men and they have built for the old companies which managed to survive through the period of depression, the efficient light plane of today. During 1922 and 1923 a great many new small companies sprang up, the entire object of which was to build light planes and to show what they could do in the way of performance with less and less engine size. This was the measure of their ability. Under these conditions also, aero clubs have flourished and entered actively upon programs of glider and light plane building. And, finally, a great many individuals, experimenting by themselves, and constructing for sport or the prospect of selling, have produced many types of small aircraft. Germany has become "light-plane-ized". Everybody, even the lay public, is thinking in terms of light planes.

A Cross Country Race

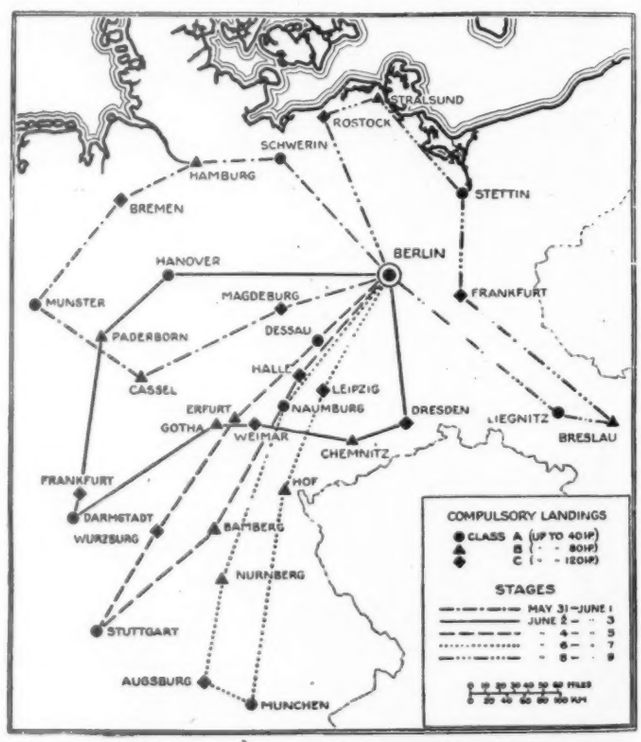
In 1924, the Aero Club of Germany, which had held, up to this time, many local competitions, planned, for the following year, a great free-for-all race, which should include everyone seriously able to consider a 3,300 mile reliability flight. The public, they argued, must be shown that these light planes and sport planes are practical and can stand the test of every day inter-city use. In order to reach the lay public, who are the people to be sold on aviation, *who are, in fact, the potential market for any serious aeronautical industry, the* Aero Club determined to conduct this race across the entire country, stopping at every important city, and criss-crossing the centers of population so that every individual in the nation would either see the race or have it come so close to his home that everyone around him would be talking about it and about the different airplanes flying in it, and their points of advantage and disadvantage for the every day user.

Note that these airplanes are not war airplanes, which may derive a secondary interest from the spectator, such as he gives to an exhibition of artillery, nor are they special racers of enormous power and a cost entirely out of the range of the average potential buyer, even if he could conceivably have a desire to own one. They are practical, inexpensive touring cross-country airplanes all ready to be run by the owner just as he runs his car. This is the sort of performance that will be the topic of conservation in every home in a nation.

The entries in the *"Rundflug"* were divided into three classes, according to their horsepower. There were 28 of under 40 hp. in class A; 34 of between 40 and 80 hp. in class B, and 30 of between 80 and 120 hp. in Class C. Prizes were offered in each class so that there was no unfair competition. $5,000 was the first prize, $3,000 the second prize and $2,000 the third prize in each grade. The race started in Berlin and made a circuit of cities in northwest Germany, returning to Berlin, a total distance of 600 miles, which had to be covered during the first two days of the race. Starting on the third day, a second circuit or stage was flown, an inter-city race through western Germany. On the fifth day the third circuit was begun from Berlin, covering the cities in the south-western part of the country as far as Stuttgart. The fourth circuit went to Munich and the fifth, east to Breslau and north to the sea, ending as before in Berlin. Three thousand three hundred miles in ten days with compulsory landings in all the more important cities of the land comprises a rather severe test of reliability for light planes.

Formula System in Awards

It is of interest to recall in regard to the rules which were somewhat elaborate, that the Aero Club officials do not avoid so strenuously as we do the formula system of awards and are not disturbed by their complexity if it tends toward a more just distribution of prizes and a judicious direction of design toward desired types of performance.



The five-circuit course of the Round-Germany Flight. Machines started from and finished at the Templehofer airdrome, Berlin, the planes flying anti-clockwise

If any entrant was unable, through engine trouble or other cause, to get back to Berlin on the specified date on any leg of the race, he was allowed to enter the next stage at the place on the route nearest his position, with, of course, a corresponding loss in points. There was also a deduction in points for change of engine or of pilots. Additional penalty deductions were made for changes in any sealed portion of the machine. All the entries in each class were started

off together at 4:00 a.m. on May 31. It was found that, on the large aerodrome, the Templehofer Field in Berlin, this could be accomplished with no danger of collision by lining the machines up 100 yards apart across the field.

Germany's Restrictions Prove Valuable

In the interest of aeronautics, the restriction on German military aviation is a very fine thing because it is diverting all of the aeronautical genius of that country into useful aeronautical channels. In the interest of our own industry and that of other countries, it might be advisable to allow and encourage the production in Germany of war airplanes. Otherwise it may soon be necessary to increase our already high protective tariff, in order to keep out a flood of inexpensive and efficient sport and light planes from Germany that will presently seek, also, a foreign market. The view has already been expressed that the future aeronautical industry will have largely to do with light airplanes for private use. The greatest conceivable air passenger transport service can scarcely absorb more large commercial airplanes than the product of two or three aircraft factories. As in the automobile industry, where it is the private car that is the backbone of the industry, so it must eventually be in aviation.

Among other lessons from the *"Rundflug"*, we may perhaps learn something from their method of obtaining prize money. Instead of trying to collect the prizes from the spectators, who are presumably to be sold on aviation, the Aero Club of Germany found it possible to obtain $70,000 presented for the prize list. The chief donor was the Berlin newspaper B.Z. which gave $20,000. Newspapers in this country, more than in Germany, live on sensational news of this sort. If properly approached, some of the syndicates operating papers in a number of cities, would be the best field for obtaining prizes for an inter-city race planned with compulsory landings in each city in which they have offices.

Arrangement for Flights of Aircraft Between the United States and Canada

By an exchange of notes between the Department of State and the British Embassy in Washington, the arrangement between the United States and Canada with regard to the entry of United States pilots and aircraft into Canadian territory, has been extended to and including April 30, 1926.

This arrangement has been in effect since 1922 and provides, in general, that when an American machine or pilot wishes to cross the International Boundary and fly in Canada, notification should be sent, in advance, to the Secretary of the Air Board, Ottawa, giving the date of the proposed flight; the owner's name and address; the pilot's name and qualifications; the type of machine to be used; the route and duration of the proposed flight and the purpose for which it is being undertaken.

Commercial Aircraft

When a commercial aircraft wishes to enter Canadian territory, the owner should make application, in advance, forwarding, at the same time, a copy of the pilot's graduation or discharge certificate from the United States Army or Naval Air Services and two passport photographs of the pilot. As there is no authority issuing pilots certificates, other than the Army and Naval Air Services in the United States, and the great majority of pilots had served in either of these services during the War, it was decided to limit the privilege to pilots who had taken the course of training in these services. Exceptions are made in favor of civilian pilots who can produce proof of qualifications equal to those necessary to obtain a pilot's certificate in Canada.

Application for registration of the aircraft, in accordance with the terms of the International Convention, must also be made and the registration markings must be painted on the machines. The Underwriters' Laboratories, it is understood, are allotting registration marks in accordance with the Convention, and their numbers are accepted in Canada.

If a machine is not registered with them, markings are allotted by the Air Board, in all cases commencing with the letters N-C. Full particulars of aircraft must be forwarded with the application for registration. Should the machine be of a type which has not yet been granted a certificate of airworthiness, an investigation of its design is made. If it is found to comply in all essentials with the standards approved in Canada, a type certificate is issued. If, on the other hand, it is below the standard called for in Canadian machines, permission is refused to fly it in Canada. The registration fee is $5.00. The fee for a "type certificate" of airworthiness is $25.00, and the certificate of airworthiness for an individual machine $5.00. Aircraft, engine, and journey log books should be carried on all machines entering Canada.

No commercial operations of any nature are permitted within Canada by United States machines, but they may carry goods or passengers from a point in the United States to a point in Canada, and vice versa.

Private Aircraft

In the case of private aircraft, the pilot should forward two passport photographs of himself and a copy of his graduation or discharge certificate from one or other of the United States Air Services. The application for registration of aircraft should be made and registration markings painted on the machine, in the same way as is called for in the case of commercial machines. The Secretary of the Air Board should be notified when machines enter or leave Canadian territory and Customs clearance is to be made at the port of entry and departure. A private license does not allow for flying operations for remuneration or reward to be carried out in Canadian territory, nor is it necessary for a private aircraft to be certified airworthy.

Customs Regulations

The provisions of Part 10, Air Regulations, Canada, 1920, in regard to reporting to the Customs authorities when entering and leaving Canada, are strictly enforced. Owing to the fact that there are so few licensed Customs Airharbors in the country, it has not always been possible to enforce regulation 96, calling for an initial and final landing at a Custom's Harbor. Arrangements will be made when necessary to have the Customs authorities at the nearest port of entry on the border, make the necessary entries.

This arrangement has been renewed by the two countries yearly but, in the more recent renewals, the provision has been made that the United States Army or Navy Air Services shall certify as to the airworthiness of American machines desiring to fly in Canada, and all owners of aircraft wishing to cross into Canada are required to obtain a certificate of airworthiness before crossing the border.

In this connection it is to be noted that, by Executive Order of July 14, 1924, in cases of airships coming to the United States from foreign countries, the Secretary of State should be informed in advance of the date and place of the expected arrival.

The Crawford Courier No. 1

A very interesting and, from the photograph, very robust little light plane is the new Crawford "Courier" No. 1, built by the Crawford Airplane Co., of Venice, Calif. The plane is fitted with a 45 hp. radial air cooled Anzani engine and is reported to have a maximum speed of 95 m.p.h. with a landing speed of 30 m.p.h., while the plane is capable of a climb to 8,000 ft. While the wings are of normal construction, with fabric covering, the fuselage which, has two cockpits, one each for pilot and passenger, is covered with vernier, and is therefore very durable. The wing section employed is U.S.A. 27 and the wings are braced with I struts. The total weight of the plane empty is 450 lb.

The Crawford "Courier" No. 1 Lightplane fitted with Anzani 45 hp. engine.

Cy Replies

The Editor,

The Man from Detroit who so dislikes my history of the Modocks, surely could not have read it with understanding. Yet I thought the definition was clear enough: "Modock: One who attaches himself to any popular movement for purposes of self-advertisement or social prestige."

Surely this plain definition excludes those people who seek to benefit aviation in any way, whether they do it by staying on the ground, or by riding in an airplane. Certainly, it did not include those people, nor was it intended to.

If, however, The Man from Detroit cares to consider his friends to be Modocks, that is his privilege. He can judge them; I cannot.

Yours truly,
Cy Caldwell

The California "Coupe–Cabin" Plane

A Closed Cabin Passenger Airplane Suitable for Private Touring

IN answer to the demand for a comfortable and efficient airplane especially planned and designed for the private owner the "Coupe-Cabin" airplane, designed and built for a wealthy Long Beach sportsman by Lloyd Royer of Glendale, Calif., fills a long felt want.

The "Coupe-Cabin" was tested and delivered about July 1, 1924, and came fully up to all expectations in regard to take-off and performance in the air. Since then, in many trips to San Diego and other California towns it has fully demonstrated its utility and comfort as a cross-country plane.

Ample Reserve Power

Because the peculiar topography of the state of California makes it necessary to cross one or more ranges of mountains in going from practically any large town to another, it was deemed advisable to use an engine that would give plenty of reserve power under all circumstances. Originally designed for 200 hp., a 300 hp. Hispano-Suiza engine was installed, and has been found to give a proportional increase in performance.

The performance figures given are the results of actual tests. The U.S.A. No. 27 wing section gives a surprisingly flat glide and the machine lands and pulls up in much less space than that usually required for the familiar JN4.

The stability and ease of control in flying have been remarked upon by all pilots who have flown the machine, many pilots being especially pleased with the amount of vision afforded, as, owing to the shape of the cabin, it is possible for the pilot to see the rudder while in flight, this vision to the rear being impossible in most cabin planes built heretofore.

The after part of the cabin is made as closely streamline as possible, thus greatly reducing resistance and leaving the air flow over the empennage practically unrestricted.

The entire fuselage is covered with Haskelite mahogany plywood, on four spruce longerons and ten bulkheads. A novel method of keeping the interior of the cabin clear is used. The wings are pinned to the corners of two large bulkheads, set transversely, in the cabin, thus doing away with the necessity of any cross-wires. The entire cabin is lined with mahogany plywood, giving double stiffness to this part of the fuselage. A 50 gal. gas tank is slung under the floor, between the lower wings, and a wind driven pump keeps the 20 gal. gravity tank, above the cabin, filled at all times. The pilot is seated in the front of the cabin and has ample vision at all ranges of flight. Immediately to the rear are two seats, with an aisle giving access to the rear seat, which comfortably seats two.

Accessibility in the Fuselage

Removing the cushion from the rear seat gives access to the after part of the fuselage and a mechanic can crawl entirely to the rear end if desired. All controls and wires pass under the floor, out of the passengers way. A complete instrument board before the pilot is in full view of the passengers likewise.

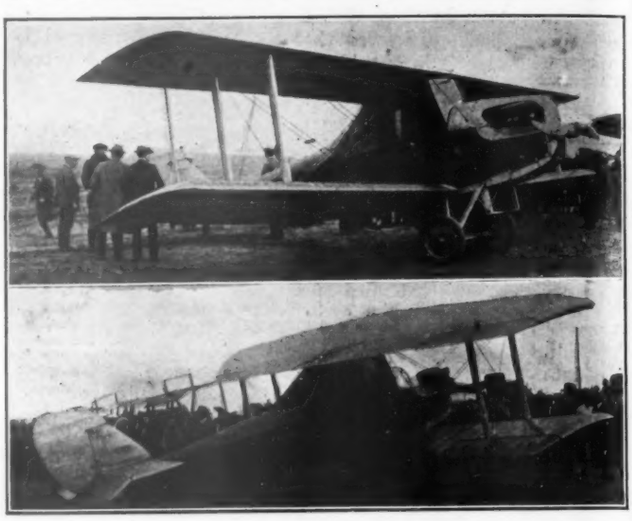
The front of the cabin is closed with Triplex glass and all side windows are of ⅛th in. Pyralin. A tight aluminum firewall completely separates the engine compartment from the cabin and conversation can be carried on in a normal tone of voice.

All upholstering is of chaissed mohair, identical with that found in high grade automobiles. The ventilation is under control and ample under all conditions.

The large door permits of easy entrance to the cabin and ample baggage space is provided under the rear seat.

The U.S.A. No. 27 section used, gives plenty of spar depth to the single-bay truss and also permits the use of much less surface than is ordinarily used, with a corresponding reduction in both weight and span. The box spars have spruce flanges with plywood sides, and the rib webs are of basswood, with spruce cap-strips. All internal wiring is of Hartshorn wire, leaving no eyes to stretch or wraps to fail.

The upper and lower wings on each side are identical and interchangeable and the light tube forming the wing tip has a handle, for tying the plane down or handling. All fittings, wire and strut attachments are concealed, giving the wings a very clean appearance. Hartshorn streamline wire is used throughout the plane, the control cables being the only exception. The ailerons are built up on a light box spar and are very rigid under torsion.



Two views of the California "Coupe Cabin."

The tailplane is a medium thickness, double-cambered section and has proved to be very efficient, giving ample control at all ranges of speed. The stabilizer is adjustable from the pilot's seat and, like the vertical fin is constructed with box beams and plywood ribs, while the elevator and rudder are of steel tubing and both elevators are built on a single torque-tube. Two streamlined steel tubes and four Hartshorn wires rigidly brace the entire tail group with a minimum of resistance.

Tail Skid and Undercarriage Details

The steerable tail-skid is connected to the rudder wires and gives complete control in taxiing.

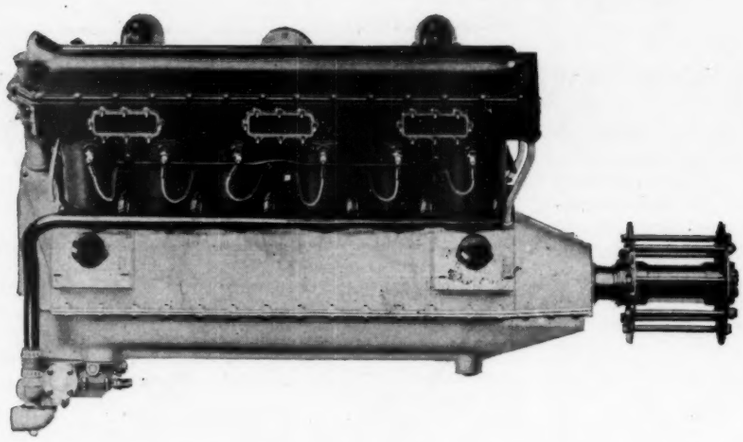
Three streamlined steel struts forming each side of the undercarriage are welded into a steel box at the lower ends which also serves as a vertical guide for the axle. The shockabsorber cord is wrapped on steel spindles, thus eliminating any necessity of wrapping the cord upon itself in successive layers, with the consequent danger of wearing or fraying.

Two Hartshorn wires and two steel tube compression members, effectually brace the landing gear against any drift or side motion in landing.

SPECIFICATIONS

Span	40 ft.
Chord	5 ft. 6 in.
Gap—at cabin	6 ft.
Incidence—lower wing	2 deg.
Decalage	1½ deg.
Dihedral—lower wing only	2 deg.
Stagger	None
Wing area—inc. ailerons	396 sq. ft.
Aileron area	39.5 sq. ft.
Stabilizer area	33 sq. ft.
Elevator area	22 sq. ft.
Rudder area	13.5 sq. ft.
Fin area	8 sq. ft.
Weight, light	2150 lb.
Fuel	490 lb.
Passengers, (5 at 160 lb.)	800 lb.
Weight loaded	3440 lb.
Wing loading	8.6 lb. per sq. ft.
Power loading	14.4 lb. per hp.
High speed	112 m.p.h.
Landing speed	48 m.p.h.
Engine	300 hp. Hispano

Ten Years of Packard Pioneering in Aircraft Motor Development
1915-1925



Packard Model 2500

Develops 800 B. H. P. at 2000 R. P. M. Weighs only 1130 pounds—1.4 pounds per horse power. Bore, 6 3/8″, stroke, 6 1/2″, displacement 2500 cubic inches. The most powerful aircraft motor for its size in the world. Two types—direct vertical and vertical with two to one reduction gear.

Versatility —

Packard Aircraft Engines Adapted for Every Type of Service

EVERY plane designer whose ship falls within the power range of 400 to 800 H.P. will find in the Packard line of Aircraft Engines exactly the right power plant for his requirements.

Pursuit ships and fighters, bombers, patrol sea planes, amphibians — all these types of ships are now being equipped by the United States Government with one of the two models and five types of Packard Engines.

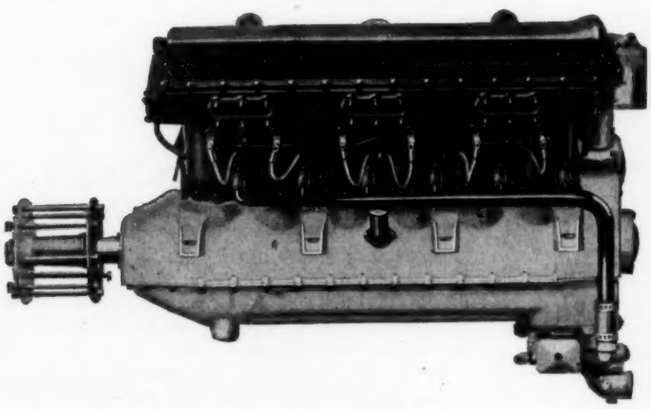
With the increased use of airplanes for commercial purposes, companies having contracts or plans for commercial work of any nature should thoroughly investigate Packard Aircraft Engines before deciding on their power plant equipment.

PACKARD MOTOR CAR COMPANY

Detroit, Michigan

Packard Model 1500

Develops 500 B. H. P. at 2000 R. P. M. Weighs 720 pounds—1.4 pounds per horse power. Bore, 5 3/8″, stroke, 5 1/2″, displacement 1500 cubic inches. Three types—direct vertical, direct inverted, and vertical with two to one reduction gear.



ASK THE MAN WHO OWNS ONE

AIR TRANSPORTATION

Progress of Commercial Aviation in Germany

The progress made in aerial transportation in Germany during the past few years is undoubtedly one of the outstanding accomplishments in the field of aviation, says Lee C. Morse, Special Agent of the Transportation Division, Department of Commerce. Immediately following the war, numerous small independent air transport services were formed and operated over various routes on more or less regular schedules. It was not until May 5, 1922, however, that commercial air transportation in Germany made any real progress. On that date Germany was authorized to resume, under certain restrictions and control by the Allies, the production of commercial types of planes.

Terms of the Versailles Treaty

Under the terms of the Treaty of Versailles, Germany was forbidden to maintain any military or naval air forces. The treaty limited the size of airplanes and the horsepower of engines which could be employed or manufactured. Whether these restrictions have been a help or a handicap in the development of commercial air transportation services, can be better judged after considering their effect upon the aircraft industry from the industrial or manufacturing point of view.

The fact that Germany has been forbidden to maintain military and naval air services, has eliminated the Government as a buying factor. Similarly, the limitations on the size of planes and the power of engines which can be manufactured, has kept the industry from seeking orders for war planes, from foreign countries. Producers of aircraft have been compelled to confine their efforts to building up a market for their product, entirely within the commercial transport field. The development of aircraft for military and commercial uses in other countries has progressed in recent years along lines that make it apparent that the use of war planes for commercial purposes is decidedly uneconomical.

The German manufacturers and designers contend that, as long as they are restricted to small power plants they cannot build commercially efficient types of planes.

In spite of this, however, it is true that the concentration of the entire industry on the designing of aircraft for commercial use only, has resulted in the production of a type of plane which, in the light of actual performance, may be considered among the safest, most economical, and efficient now in use.

Operating Companies

It is in the operating field rather than the technical, that the greatest progress has been made. At the present time there are two air transportation companies in Germany, the Deutscher Aero Lloyd Aktien Gesellschaft and the Junkers Inftverkehr. The growth of these two companies has been so remarkable that they now form two powerful groups of air services which have almost succeeded in dominating the principal air routes of northern, eastern and central Europe.

The Deutscher Aero Lloyd

On February 6, 1923, the Deutscher Aero Lloyd came into being as a result of the amalgamation of a majority of the existing smaller independent companies. This company lists among its stockholders many of the leading shipping companies, business houses, and banks of Germany, such as: Hugo Stinnes, Thyssen, A. E. G., Hamburg Amerika, Norddeutscher Lloyd, Deutsche Bank, etc. During 1924, this company formed a very powerful group of subsidiary and associated companies constituted as follows, new companies formed in 1924-25, being indicated by an asterisk:

Deutsche-Russische Luftverkehrs A. G. Moscow ("Deruluft").
Dansiger Aero Lloyd A. G.
*Chermitzer Infthafen G. m. b. H. Charmitz, capital 500,000 marks.
*Mitteldeutsche Aero Lloyd A. G. Leipzig, capital 140,000 marks.
*Subdantsche Aero Lloyd A. G. Munich, capital 750,000 marks.
*Wurtemburgische Inftverkehrs A. G. Stuttgart, capital 700,000 marks.
*Badische Inftverkehrs A. G. Karlaruhe, capital 350,000 marks.
*Tadische-Pfalsische Inftverkehrs A. G. Mannheim, capital 100,000 marks.
*Dortmunder Inftverkehrs A. G. Dortmund.

Junkers Inftverkehrs

The Junkers Inftverkehrs A. G. is the air transport branch of the Junkers Flugzeugwerke A. G. and is unique among air transportation companies in that it was organized primarily to furnish an outlet for the airplanes produced by the parent company. Like the Aero Lloyd, the Junkers company has formed a group of subsidiary and associated companies constituted as follows, new companies being indicated by an asterisk:

Rumpler Inftverkehrs A. G. Munich.
Bayerische Luft Lloyd, Munich.
Oesterreichische Inftverkehrs A. G. Vienna.
Ungarische Aero Express A. G. Budapest.
Ad Astra A. G. Zurich.
Aeronaut A. G. Royal.
Aero C/X Helsingfers.
Aero-Lat A. G. Riga.
*Sachsische Luftverkehrs A. G. Dresden, capital 750,000 marks.
*Westflug G. m. b. h. Oeynhausen, capital 82,000 marks.
*Sudwestdeutsche Luftverkehrs A. G. Frankfurt-Au-Main, capital 400,000 marks.
*Oberschiesische Luftverkehrs A. G. Gootwitz.
*Schlesische Luftverkehrs A. G. Breslau, capital 400,000 marks.
*Flugverkehr Halle A. G. Halle, nominal initial capital 160,000 marks.
*Luftverkehrs Fesselschaft Ruhrgebient, Essen, capital 2,500,000 marks.
*Bremer Luftverkehrs Cassellschaft, Breman.
*Dansk-Lufttransport Aktienelskhab, Copenhagen.

It is the intention of the Junkers company to combine all the companies with which it is now associated into an organization to be known as the "Europe Union," with which would be merged the existing "Trans-Europa" and the "Nord Europa", unions. In the new combination the main object of the Junkers company is the standardization of planes of Junkers construction and the establishment of a uniform system of maintenance and repair. In other words, the Junkers company would take care of all matters of a technical nature and the local companies would be responsible for the sale of tickets, handling of freight and mail, and all phases of commercial management.

On Schedule Time

It takes a lot of courage to start a five-passenger plane off on its scheduled trip with one passenger, or with no passenger, and with only a small pouch of mail to help pay for the three or four hundred mile voyage. But this is the order in Europe. For the past five years, air liners have been plowing along their scheduled routes with or without passengers. The only machines carrying anything like capacity loads, are the cross-channel liners, and these only during the tourist season. The Paris-Brussels-Amsterdam liners carry fair loads at times, and so does the Berlin-Koenigsberg line, but even on these lines, planes make an entire voyage frequently with only one passenger, and sometimes with empty cabins.

The Germans have started their twelve-passenger airplane service from Berlin to Amsterdam, but as yet the traffic is less than three passengers per trip. On the Amsterdam-Basil line, a long stretch covering five flying hours, there are also less than three passengers listed on the log of the twelve-passenger, three-engined Handley Page. A fair estimate of the average passenger load on European air liners today, is one-third cabin capacity. Air lines, however, are not halting operations on the score of passenger scarcity. They include that in their development program. The present traffic is registered as part of the educational program. Real air traffic is looked for later.

AIRPORTS AND AIRWAYS

Opens Two Air Mail Bids

Two bids were opened by Postmaster General New on Dec. 8 for the air mail route between Chicago and Birmingham, Ala., with stops at Indianapolis, Louisville and Nashville.

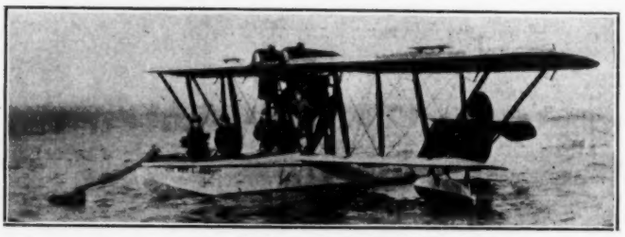
The Roscoe Turner Airways Company of Birmingham and Sheffield, Ala., bid four-fifths of the revenues from air mail postage. The Federal Aircraft Company of Newark, N. J., bid 79 per cent of the revenues.

The Federal Aircraft Company's bid was not accompanied by the necessary bond and was disqualified. Whether the Turner Airways bid will be accepted remains to be determined.

For Miami-Key Largo Service

The Fairchild Aviation Corporation has purchased from the Aeromarine Plane and Motor Corp. the model AMC flying boat. This boat was built in 1923 and was operated during the winter of 1924 in Porto Rico by Cy Zimmerman, during the summer it was used around New York by the President of the Aeromarine Co., Inglis M. Uppercu. The boat is a single bay biplane, fitted with a Liberty motor, the hull is made of duraluminum and seats six passengers besides the pilot and mechanic.

The boat has been in the water for almost a year and a half and the hull has stood up remarkably well. Considerable difficulty was experienced at first in keeping the paint on the bottom of the hull but this problem has apparently been solved. The rapid growth of barnacles on the bottom has necessitated hauling the ship out several times. The boat was thoroughly overhauled before delivery and about 140 new rivets were put in place. Also one section of the keel was found to be coroded. As the other sections were in good shape the corosion was apparently due to faulty heat treating. The particular section which coroded was in one of the most complicated parts of the structure but rather to the surprise of the designers the replacement work was very little more difficult than if the boat had been built of wood.



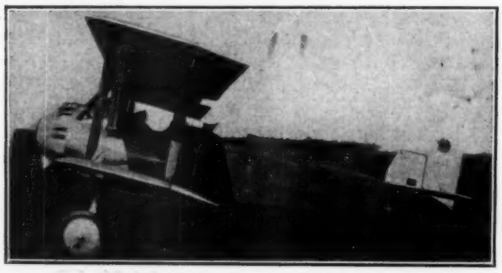
Metal boat purchased by Fairchild for use in Florida

According to the newspapers the boat is equipped with Liberty motors totalling 400 hp. and will be used for flights between Miami and Key Largo, Fla.

$3,500.00 Type 2-A WOODSON EXPRESS Lots of six $3000.00

SPEEDY
STURDY
STABILITY
QUALITY
RELIABILITY
ECONOMICAL

Pay load 450 lbs.
Max. Speed 138 M.P.H.
Min. Speed 40 M.P.H.
Cruise 100 M. P. H. at half throttle leaving 100 H.P. reserve power



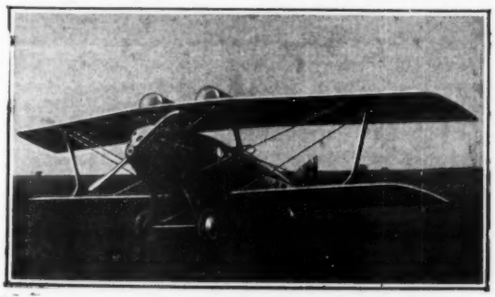
Designed for mail feeder lines, intercity passenger and express lines, mapping, etc., can be converted instantly being equipped with folding, seats in front that can be folded back out of the way when cargo space is needed, it is also equipped with doors in the floor with everything clear below for mapping.

FOR MAIL FEEDER LINES

We offer this model equipped with the Wright J-4 200 HP air cooled radial, quotations upon request.

Write for Booklet Giving Description of this Wonderful Performing Plane.

WOODSON ENGINEERING COMPANY - - BRYAN, OHIO



THE FRANCO-ROUMAINE

High, Speed, Load
RADIATORS LAMBLIN
WATER AND OIL
Have the World's Records
30.000 Radiators in working

Établissements LAMBLIN, 36, Bd Bourdon, NEUILLY-SUR-SEINE (France)

Lincoln Booster Use Pathfinding Plane

The Lincoln, Neb., Chamber of Commerce and the Lincoln Standard Aircraft Corp., are to be congratulated on boosting their city and the progress of aviation through the use of two 'pathfinding' planes which will conduct an extensive tour from the twin cities in the North to the Gulf of Mexico in the South. The start of the trip which will last three months was made on Nov. 21.

The christening of the Lincoln Standard 5 was one phase of a ceremony attending the hop-off of the ships in the Lincoln-Southland airplane trade excursion initiated by the Lincoln Chamber of Commerce and the Lincoln Standard Aircraft corporation, co-operating. The excursion is believed to be the first of its kind ever undertaken by any city in the country.

The flagship was christened by former Governor McKelvie who, as he broke the bottle on the propeller, said: "In the name of the Lincoln Chamber of Commerce and the Lincoln Standard Aircraft corporation, I christen this airplane LS5 and dedicate it and its mate to use in blazing a trail to the air line to 'link up with Lincoln cities of our neighboring Gulf of Mexico to set up the first north-south trans-continental states to the north, those along the Gulf coast and intermediate points between these cities."

Christening of the LS5 by former Governor McKelvie was witnessed by John D. Bushnell, president of the Chamber

Continued on page 888

Lincoln Booster plane on long pathfinding trip

The C-6 Travel Air Airplane

IS A GOOD INVESTMENT FOR AIR MAIL BIDDERS

Useful Load 900 Lbs.
Speed - - 125 Miles per hour

Controllability so easy, pilots can make long trips with variable loads, without undue fatigue.

We also are building Travel Air Wright J-4 planes for one company, to be used in Air Mail Service.

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PERFORMANCE

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This ship weighs only 450 pounds empty. Fuselage is constructed of veneer and has U.S.A.-27 wing curve with I struts, at a reasonable price of $1?00.00.

ALSO

have light monoplane under construction which will be put on the market about January first. Write for particulars.
We are in a position to take contracts for the manufacture of aeroplanes of all descriptions, wings and motors, for considerably less than anyone else, as we furnish our own parts and supplies from our large stock. Write us your requirements.

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Editor

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of Commerce, the board of directors of the chamber, and W. S. Whitten, secretary; City Commissioner Trev. E. Gillaspie; Monte Munn; Jacob Molindick of Wichita, Kan., one of the cities at which the excursionists will stop; a group of aviators from the airplane plant and a representative of Lincoln newspapers, Ray Page, president of the airplane corporation, was master of ceremonies.

Landing will be made at the following cities, all of which are being notified by the Chamber of Commerce that the trade junket is being sent out: Concordia, Saline, Hutchinson and Wichita, Kas.; Ponca City, Enid, Guthrie, Oklahoma City and Chickash, Okla.; Wichita Falls, Gainesville, Sherman, Denison, Dallas, Fort Worth, Waco, Temple, Austin, Brenham, Houston and Galveston, Tex.

It is the purpose of the pathfinders in making these stops to determine which of the towns in the itinerary will make suitable landing places in the north-south trans-continental air route. The advantages of Lincoln as a business town, as a home city and as an educational center will be stressed in each.

Jacksonville Plans Airport

Jacksonville, Fla., has hopes of becoming the hub for air transport operations in the South and Eastern part of the United States. The airport will be located two miles north of the city limits on the Dixie highway. The new field will be called the Vanderbilt Airport and the ground has been loaned to the city and Mr. Vanderbilt by S. J. Nelson and associates, the owners.

The field itself will cover 100 acres and the landing space will be 1,700 by 2,600 ft. The planes will have a take-off in any direction, according to which way the wind is blowing, because of the L-shaped arrangement of the landing space.

Various airlines radiating from the city are planned. According to a telegram from Cornelius Vanderbilt, Jr., the first plane of the Rodman Wanamaker New York-Jacksonville airline will arrive at Jacksonville during December. According to plans announced in the Jacksonville papers the Wanamaker line will begin its service with ten -twenty-passenger planes which will make a trip a day between Jacksonville and New York city, an air line distance of 850 miles. Flights will be made with three stops, the last leg being between Augusta and Jacksonville.

There are also plans for a service between Jacksonville and points South, such as Miami, Tampa and Havana.

Anderson, Ind., News

The Anderson Aircraft Co., of Anderson, Ind., have developed a high lift wing to meet the requirements of the under-financed commercial pilot whose funds are not sufficient to make the initial payment on a new three place job. Such a pilot may own an old training plane or a cracked up previous training plain in which he can put new longerons, fittings and wires where needed, recover and use a set of high lift wings and start again, (from the Anderson Company) out of debt, according to information.

In some instances, pilots have two and three wings and can dispose of these for sufficient cash to partly pay for the high lift wings.

The Anderson company state that they are sawing new airplane selected ash longerons at practically cost to encourage the replacing of these vital parts before rebuilding with the high lift wings. The lift of these wings is said to be close to 1,200 lb. useful load, including pilot, fuel and passengers. The factor of safety due to the exceedingly wide spar from fresh stock is stated to be practically three times that of the old Jenny. The aerofoil is a modification of the Aeromarine No. 2 wing curve.

The company also developed a new 27 x 4½ tire to insure better landing in soft or plowed fields. This tire is also said to stop crystalization in axles and landing gears, to reduce the rewrapping of shock cords one third or more and to per-

AIRPLANES FOR SALE

We have sold 105 airplanes this year, which leaves a balance of 228 airplanes still for sale. We believe the prices on airplanes are at their lowest, and a small deposit on any of our airplanes will hold same for spring delivery. We expect a sharp advance in prices very soon.

We still have plenty of Standards, Jennies, Canucks, Orioles, D.H.'s with Liberty motors, Spads less motors, T.M. Scouts with and without motors. A large number of these airplanes are set up test flown, and ready for immediate fly away delivery. Come and take your pick.

NEW STANDARD J-1 AIRPLANES with guaranteed overhauled Hispano-Suiza motors, 150 H.P.	$1500.00
NEW STANDARD J-1 AIRPLANES with new OXX6 motors	1300.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OXX6 motors	1100.00
NEW STANDARD J-1 AIRPLANES with new OX5 motors	1100.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OX5 motors	900.00
NEW STANDARD J-1 AIRPLANES without motor	650.00

These airplanes come complete with tools and instruments and the front seat is built so as to accommodate two passengers. These airplanes have been reconstructed and new longerons, new controls, new wires, new struts, new fittings, new instruments were installed where needed. ⅓ deposit will hold any of the above airplanes for spring delivery, storage and insurance free.

LEARN TO FLY

NO BOND REQUIRED FOR SOLO FLIGHTS AND NO CHARGE FOR BREAKAGE

$100.00

ROOM AND BOARD NEAR FIELD AT $10.00 PER WEEK

The splendid response to this special offer (originally limited to June, July and August) permits us to extend it until further notice.

We will guarantee to teach a student to fly and successfully operate an airplane by himself, regardless of the number of flying hours required, and further, to furnish an airplane, free of charge, for the period of one hour for practice flights.

The flying school of the Robertson Aircraft Corporation is one of the oldest and best known in the United States. All of the instructors are ex-army aviators with wide experience and the equipment is the best that money can buy. The flying field is approximately six miles from the city of St. Louis and is easily accessible by railroad, street car and hard surfaced roads. It is the largest and best privately owned field in the country and the International Air Races of 1923 were held there.

Our course includes thorough flying training as well as complete instruction in the over-haul, care and maintenance of both the airplane and motor. The time within which one can learn to fly, varies with the individual; eight to ten hours of dual instruction, stretched over a period of ten days to two weeks should complete the most stubborn case, and from then on, the refinements of the art can be gained only from experience. Commercial aviation is a rapidly growing industry. Don't delay! Enroll now!

WRITE FOR BOOKLET.

ROBERTSON AIRCRAFT CORPORATION

ST. LOUIS FLYING FIELD, ANGLUM, MO.

mit a quicker take-off and a far more pleasurable landing on a rough field.

The Anderson company is also devoting considerable time to the building of a new six cylinder radial air cooled commercial motor, further details regarding which will appear later.

Chicago Airports

By Terence Vincent

The National Air Transport, Inc., plans now to begin operations regularly on its Chicago-Dallas air mail route early in April, 1926, with "Curtiss Carrier Pigeons." General Manager Paul Henderson admits he has discovered many details essential to the operation of a commercial airline, that takes a lot of time but must be done.

The Aero Club of Illinois has done less than usual amount of Autumn flying, because the roadways into the airdrome have been under repair most of the season. The E. M. Laird Airplane factory there is ready to start production; and Billy Brock is reported ready to operate a de luxe taxi-plane service using "Laird Commercial" biplanes.

Sanger Tours, famed among Kiwanis Clubs and others for land tours, have booked flights for Chicago pilots. Two men overslept in a loop hotel before the Notre Dame—Northwestern football game in South Bend, Indiana, and 90 minutes after leaving the loop in an automobile, they were in South Bend with Ray Mack's airplane, to see the famous football game.

Fort Worth, Texas

By G. F. Bischof

Some of the boys helped the American Legion with their services here by dropping flowers down on the crowd in Burkburnett Park, which is right in the very heart of the town consisting of one block in the business district.

In the afternoon services were held for the members of the Shenandoah at the mooring mast, a big beautiful floral design presented by the members of the Young Men's Business League. Six of the flyers landing at the mooring mast to assist in the services.

Officials of the National Air Transport Co. were in the city and inspected the new flying field which luckily the Fort Worth Flying Club had been instrumental in helping locate, being only 4 miles north of the center of the City. Fort Worth is to be on the route and the terminus of the Chicago-Fort Worth Mail route.

Visiting flyers can find the field very easily by noting the big smoke stack of the cement plant on the west and the helium plant with its mooring mast on the east, the field with a 100 ft. circle marker in the center being exactly between these two points, visiting flyers are not charged anything for landing, fuel and services are on hand.

Fred Estill and Ross Arnold had never made parachute jumps before, so Sunday, to give the crowd some amusement, they went up 2000 ft both making nice jumps and was worth the money (not costing anything) but a collection taken from the crowd netted about $19.50.

Most of the entertainment came from their enthusiasm in their description of the thrill of the jump.

A Marker For Paterson

A marker is being placed on the roof of the main factory building of the Wright Aeronautical Corp., at Paterson, N. J. The marker will be in letters 12 ft. high, made of white tile, placed on the black background of the tar roof of the building. The lettering will read: WRIGHT AERO. CORP.

THE LINCOLN STANDARD AIRCRAFT CORPORATION

Largest builders of commercial aircraft in the Middle West

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NEW FIVE PASSENGER PLANE *at*

$2875.00

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A DUPLICATE OF THE FAMOUS LS5, in QUALITY, CONSTRUCTION, and PERFORMANCE.

SPECIAL FEATURES

This plane is of all new construction,
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Steel landing gear
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Beautifully upholstered in leather
Duco finished
Equipped with Model A 150 HP motor.
Outside oil reservoir,
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Hamilton propeller.

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LINCOLN, NEBR.

United States Air Forces

U. S. ARMY AIR SERVICE

Will Attempt New Altitude Record

Plans are being made at the Engineering Division, McCook Field, to attempt another altitude record flight. An experimental model airplane, designated as the XCO5, is being especially built for high altitude work. The Lepere biplane, with which the United States broke all altitude records two years ago, is being retired for a more modern machine.

This new airplane is being especially constructed for the installation of a supercharger. The older machine was not built for a supercharger, but the supercharger was put on anyway, with considerable engineering difficulty. The new plane is to have wings of greater lift and a propeller of larger diameter. This is necessary in order to gain lift and power in the high altitudes where the air is very rare. The wings are being constructed of wood and fabric; they are deeply cambered (curved), being extremely thick at the leading edge and tapering sharply to the rear. The wings present a total area of 600 sq. ft. with an aspect ratio of ten. The propeller will be a detachable blade aluminum alloy 10 ft. 6 in. in length with an adjustable pitch.

Within the plane liquid oxygen flasks will be installed and space made for the various instruments that will be carried.

The X-C O-5 with which McCook Field will try and beat altitude Record

The interior of the cockpit has been completely lined with plywood and quilted felt corduroy. The covering within the cockpit comes up around the pilot's neck, which helps to keep out some of the terrific cold.

A 400 hp. Liberty engine will be used. That is, the Liberty motor delivers 400 hp. at sea level, but at an altitude of 50,000 ft. this motor delivers only the small amount of 50 hp., without the supercharger. With the supercharger, however, the engine will deliver enough horsepower to enable the plane to maintain itself and still climb at altitudes above 30,000 ft. The exact amount of horsepower that can be obtained at this altitude with the supercharger depends upon meteorlogical conditions.

The altitude record at present is held by M. Callizo, of France, who, in October 1924, reached an altitude of 39,586.47 ft. With the new equipment an altitude of over 40,000 ft. should be obtained. It is the hope of engineers to be able at some time to reach an altitude of 50,000 ft.

Another One-Wheel Landing

Lieut. C. J. Kenney, A.S., narrowly escaped wrecking a DH and perhaps seriously injuring himself and his passenger, Lieut. L. F. Watson, Q.M.C., while flying around Post Field, Ft. Sill, Okla., on the morning of Nov. 14th.

The pilot was flying a few feet above the ground, and in attempting to bank steeply, hooked the right wing skid in the

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Real performance in a three place ship with a stock OX-5 motor

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Winter Bargains

JM tachometer shafts $5.50, Zenith small type altimeters, $7.50. Dixie single or double ignition switches, $2.25, Bosch ignition switches $2.75, 3 day 17 jewel airplane clocks $8.00, oil gauges, 50 lb. $1.75, 60 lb. $2.00, 120 lb. $2.25, New Dixie 800 magnetos $30.00, new Hisso piston pin bushings $.90 ea., New Hisso piston rings $.30, complete set OX5 tools $9.00, complete set of 20-OX5 hose connections $1.25, complete set of 80-OX5 gaskets $3.00, Berling breaker points platinum, per pair $4.50, New OX5 Berling magnetos $12.50, wool lined winter flying moccasins, per pair $5.00, Fahrenheits $8.50, New J.N. radiators $25.00, new wicker seats $3.00, OX5 crank shafts, $6.00, 10 lb. air gauges $.75, uncovered J.N. rudders, elevators & ailerons $5.00, Resistal goggles $2.50.

AIRPLANES, MOTORS, DOPE, WINGS, PROPELLERS, SUPPLIES, LARGEST STOCK IN THE U.S.

NICHOLAS-BEAZLEY AIRPLANE CO.
Warehouses, flying field & factory **Marshall, Mo.**

ground, twisting the right axle until the wheel leaned almost parallel with the right landing strut. Realizing instantly that he had badly damaged the landing gear, Lieut. Kenney opened the throttle wide and succeeded in getting into the air again.

The accident was seen by many people, who gathered on the field to see the crack-up which seemed inevitable.

After flying for a few minutes, Lieutenant Kenney brought the plane down, and displaying wonderful nerve and precision, landed gently on the good wheel, taxiing up to the line amid the shouts of applause and congratulations of the spectators. This was the first real thrill furnished by the pilots at Post Field for many a day.

The above incident recalls to mind the successful one-wheel landing made by Captain Earley E. W. Duncan at Mitchel Field during the International Air Races.

"Captain Duncan, shake hands with Lieut. Kenney!"

Metal Landing Gear For DeHaviland AirPlanes

The Field Service Section, Fairfield Air Intermediate Depot, and the Engineering Division, McCook Field, are cooperating in the development of a metal landing gear for the DeHaviland airplane, similar to the type used by the Air Mail Service. The old DH axles, wheels, and brace wires are used, but the wooden struts are superceded by tubing; the axle streamlining is the only wooden part that is retained. This metal landing gear has given excellent satisfaction to the Air Mail Service, and it is expected that it will be in great demand at Air Service stations. It is the hope that the first lot of these new undercarriages will be manufactured without delay.

Brooks Field Flying Time

For the period ending Nov. 9th the records at Brooks Field, San Antonio, Texas, showed 808 daily aircraft hours, 1,537 daily man hours, 341 daily cross-country hours and 603 daily cross-country man hours.

For the week ending Nov. 16th the daily aircraft hours were 653:55, daily man hours, 1121:50, daily cross-country hours, 65:10 and daily cross-country man hours, 129:20.

New Douglas Planes For Kelly Field

Kelly Field will soon be the proud possessor of 19 of the new Douglas O2 planes. Six of these planes will be assigned to the 3rd Attack Group and fifteen will be allotted to the Advanced Flying School. Four of the latter will be equipped with dual control.

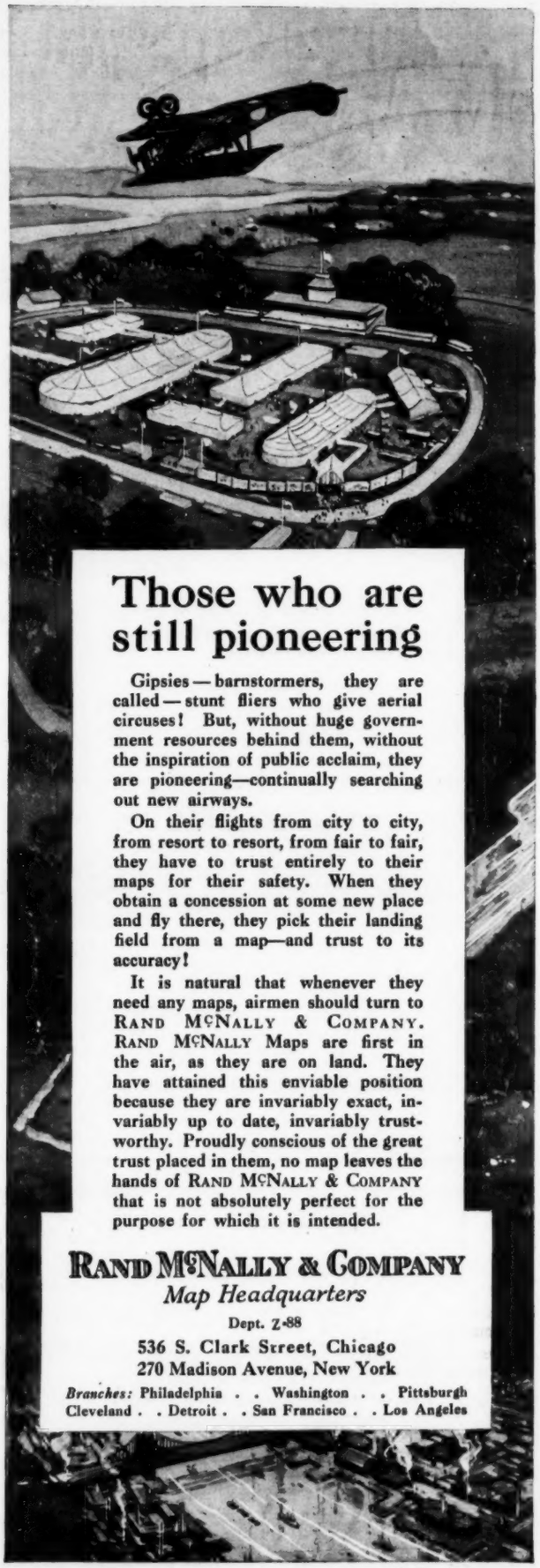
Aerial Carnival For Army Relief Fund

An aerial demonstration, such as was held at Langley Field, Va., on Nov. 11th (Amistice Day) cannot be had every day for the asking. Careful preparation of details and much laborious energy contributed to making the event a huge success.

Beginning with a take-off in formation, the planes went through various acrobatic maneuvers, chased toy balloons all over the sky, and the new planes were demonstrated and put through their paces. Visitors were given a chance to get a ride for 25c, chances being sold on a wheel for that purpose and one in every ten was a winner. The wheel was well patronized and a large number of riders were women.

A dummy battleship was built on the field which was bombed and wrecked by Thomas Morse and Martin planes. A smoke screen was laid by a DH which was a delight to everyone. The parachute jumpers next gave the crowd a thrill, and the last and most awe-inspiring spectacle was the destruction of a sausage balloon with incendiary bullets from the machine gun of a Thomas Morse. The plane swooped down on the huge bag and with a few well placed shots sent the balloon to earth in a mass of flames and smoke.

The concensus of opinion of all the civilians who witnessed the demonstration was very favorable and all agreed that the price of admission of fifty cents was money well spent.


Those who are still pioneering
Gipsies — barnstormers, they are called — stunt fliers who give aerial circuses! But, without huge government resources behind them, without the inspiration of public acclaim, they are pioneering—continually searching out new airways.
On their flights from city to city, from resort to resort, from fair to fair, they have to trust entirely to their maps for their safety. When they obtain a concession at some new place and fly there, they pick their landing field from a map—and trust to its accuracy!
It is natural that whenever they need any maps, airmen should turn to RAND McNALLY & COMPANY. RAND McNALLY Maps are first in the air, as they are on land. They have attained this enviable position because they are invariably exact, invariably up to date, invariably trustworthy. Proudly conscious of the great trust placed in them, no map leaves the hands of RAND McNALLY & COMPANY that is not absolutely perfect for the purpose for which it is intended.
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Caterpillar Club

So far as available statistics show, twenty-three men owe their existence today to the use of the parachute. There may be other cases where men jumped to safety with this aerial life belt not included in the given tabulation below. If any reader knows of such a case and the facts pertaining thereto, the submission of same to the Information Division of the Air Service would be greatly appreciated.

Saved By the Parachute

1922

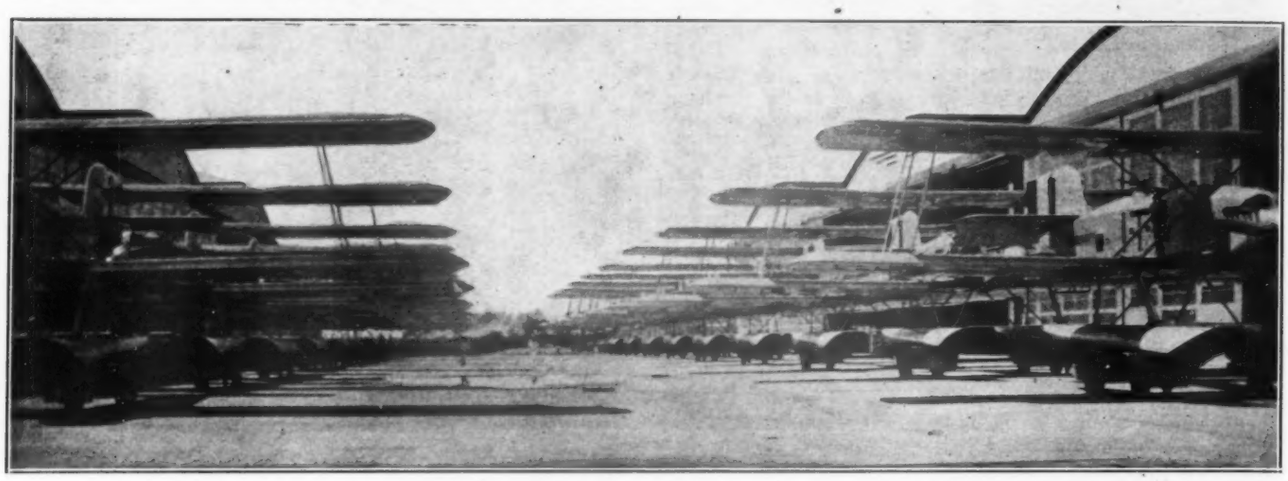
October 20, 1st. Lieut. Harold R. Harris, McCook Field.

November 11, 1st. Lieut. Frank B. Tyndall, Seattle, Wash.

1924

May 13, 1st Lieut. E. H. Barksdale, Wilbur Wright Field, Ohio.

June 5, 2nd Lieut. W. W. White, Kelly, Field, Texas.



Line up of Naval torpedo planes at Hampton Roads

June 13, 2nd. Lieut. Walter E. Lees, ORC, Johnson Field, Dayton, Ohio.

June 18, 1st Lieut. John A. Macready, Dayton, O.

July 11, 2nd. Lieut. A. R. Crawford, Kelly Field, Texas.

August 29, 1st. Lieut. L. L. Koontz and Private W. E. Coggin, Bolling Field, D.C.

October 16, Gunner W. M. Coles, U.S.N., Coronado Beach,

DOPES

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VARNISHES ENAMELS

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UNION, UNION COUNTY, N. J.
Contractors to U. S. Government

INSURANCE AGAINST FORCED LANDINGS
THREE MOTORED STOUT METAL PLANE
BUILT BY FORD MOTOR CO.
PROPELLERS BY
TRADE HAMILTON MARK
OF COURSE
HAMILTON AERO MFG. CO.
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$2475 on field, Denver.
Active, progressive men are wanted to handle the Eaglerock in exclusive territory.
Those selected will be backed with aggressive dealer helps and cooperation.
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ASSOCIATED WITH ALEXANDER INDUSTRIES
ROOM 401, ALEXANDER INDUSTRIES BLDG.
DENVER, COLO.

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Curtiss JN, two place, less motor $325.00 to $425.00
Same with motor $450.00 to $600.00
Special Reductions also on Canucks, Standards, and TM's
FLYING TRAINING $100.00
Planes, motors, parts, supplies. Write for lists
Visit us at Love Field, Dallas, Texas
Or write us at San Antonio, Texas
SOUTHERN AIRWAYS Inc.

Calif.

November 4, Capt. Wm. E. Lynd, Kelly Field, Texas.

1925

March 6, 2nd. Lieut. C. D. McAllister, Kelly Field, Tex.

March 6, 2nd. Lieut. C. A. Lindbergh .ORC, Kelly Field, Tex.

March 20, 1st. Lieut. Frank O. D. Hunter, Dayton, O.

April 6, Gunner Sgt. L. E. Mix, Marine Corps, Quantico, Va.

April 10, 1st. Lieut. J. Thad Johnson, Eagles Mere, Pa.

May 22, Lieut. C. H. Schildauer, U.S.N., Lakehurst, N.J.

June 2, Lieut. C. A. Lindbergh, ORC, Anglum, Mo.

August 17, 2nd. Lieut. K. J. Gregg, Lavernia, Texas.

October 1, Lieut. Rogers, Marine Corps, Langley Field, Va.

October 10, 1st. Lieut. Fred C. Nelson, St. Louis, Mo.

November 8, 2nd. Lieut. J. R. Hawkins and Peter Varlashkins, Merchantville, N.J.

October 27, Machinist Mate Taylor, U.S.N., Coronado, Calif.

It will be noted from the above that Lieut. Lindbergh twice resorted to the parachute to save his life.

In the list given above there were several instances where one of the occupants of the disabled airplane failed to use his parachute and was killed in the crash which followed. So far as is known there is no record where the Army parachute failed to function once the jumper got clear of the airplane and pulled the rip cord.

Army Air Orders

First Lt. Harrison G. Crocker, A.S., Kelly Field, and Sec. Lt. Charles G. Pearcy, A.S., Post Field, to San Francisco, sailing March 30 for the Panama Canal Zone.

First Lt. Joseph T. Morris, A.S., Langley Field, to New York City, sailing Feb. 12, 1926, via Govern. Trans. to the Hawaiian Dept.

Capt. George S. Warren, A.S., Scott Field, to New York City, sailing March 18 for the Panama Canal Zone.

Sec. Lt., David W. Goodrich, Fort Sam Houston, to San Francisco, sailing March 6 for Hawaiian Dept.

First Lts. Harvey W. Prosser, A.S. to Kelly Field and Roscoe C. Wriston, A.S., to Fort Sam Houston, upon completion of tour of foreign service.

First Lts. Edwin Sullivan, A.S. and Robert T. Zane, A.S., to Kelly Field, upon completion of tour of foreign service.

Capt. Charles E. Rust, A.S., to Langley Field, upon completion of tour of foreign service.

Staff Serg. George H. Slater, A.S., placed upon retired list at Brooks Field.

First Lt. Edmund P. Gaines, A.S., 7th Photo Section, to 88th Squad., Wright Field.

First Lt. Lionel H. Dunlap, A.S., Fairfield A. Int. Dep., to Com. 7th Photo Sec., Wright Field.

Sec. Lt. John O. Murtaugh, A.S., A.S. Adv. Fly. Sch., to Sec. Div., Kelly Field.

Sec. Lt. James M. Callicutt, A.S. (Field Art.), A.S. Adv. Fly. Sch., to Sec. Div., Kelly Field.

Harry Wulsin McGee, A.S. Res., Selfridge Field, relieved from assignment and duty and ordered to proceed to his home, Terrace Park, Ohio.

Sec. Lt. Edmund C. Lynch, A.S., Fort Bragg, to Scott Field.

Navy Air Orders

Lt. Comdr. Alston R. Simpson det. Nav. A. Sta., San Diego, to U.S.S. Wright.

Lt. Samuel P. Ginder det. Bu. Aero. to Nav. A. Sta., N.O.B., Hampton Roads.

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INDEX TO ADVERTISERS

A

Advance Aircraft Co. ... 890
Aeroplane, The ... 887
Aero Supply Co. ... 893
Aircraft Service Directory ... 897-898
Alexander Aircraft Co. ... 892
Anderson Aircraft Mfg. Co. ... 898
Arthur, & Co., William E. ... 886
Auto Engine Works ... 897

C

Carpenter, Ford A. ... 897
Classified Advertising ... 894
Crawford Airplane Co. ... 887-898
Curtiss Aeroplane & Motor Company, Inc. ... 868

D

Decatur Aircraft Co. ... 897

G

G. & F. Mfg. Co. ... 897
Goodyear Tire & Rubber Co. ...
Guggenheim School of Aeronautics, Daniel ... 898

H

Hamilton Aero Mfg. Co. ... 890-892
Haskelite Mfg. Co. ... 898
Huff, Daland & Co. ... 897

I

Ireland, G. S. ... 898

J

Johnson Motor Products Co. ... 897

L

Lamblin Etablissements ... 885
Lincoln Standard Aircraft Corp. ... 889
Ludington Exhibition Co. ... 898

M

Martin Company, Glenn L. ... 866
Monumental Aircraft Co. ... 898

N

New York Commercial ... 893
Nicholas-Beazley Airplane Co. ... 890

O

Ostergaard Aircraft Works ... 897

P

Packard Motor Car Co. ... 883
Pioneer Instrument Co. ... 897

R

Rand McNally & Co. ... 891
Robertson Aircraft Co. ... 888

S

Scintilla Magneto Co. ... 867
Shannon & Wert Bros. Aviation Co. ... 897
Southern Airways, Inc. ... 892
Spalding Construction Co. ... 898

T

Titanine, Inc. ... 892
Travel Air, Inc. ... 886

W

Wallace Aero Co. ... 897
Warner, Edward P. ... 898
Where to Fly ... 896
Woodson Engineering Co. ... 885-897
Wright Aeronautical Corp. ... 900

Y

Yackey Aircraft Co. ... 897

Publisher's News Letter

It may startle many persons to learn that the United States leads the world in commercial aviation. This can be demonstrated by making a distinction in the term commercial aviation that has not been given the emphasis that it deserves. There is a sharp contrast between air transport and all other forms of commercial flying. This difference becomes more apparent when the matter of regulation of aircraft is considered. There can be little question in anyone's mind that air transport which engages in interstate flying and carries valuable mail and packages or passengers should be regulated by a federal agency. Air transport requires large capital investment that needs protection; it must have well located terminals and trained ground organization; airways must be provided and facilities maintained; the flying equipment must be of the best so as to provide economical traffic service; spare planes and parts and shops must be available. In other words, the air transport development in commercial aviation must be fostered and developed by organizations backed by large resources. Each of these companies must have a staff of varied abilities and experience. The management must be well grounded in financial operations; the operating staff must know how to keep the flying equipment and schedules up to the requirements of a regular service; last and more important than the others, in the opinion of many, the traffic department must know how to create, handle and increase an entirely new service to the public. To do this on a profitable basis, without subsidy, is the great unsolved problem of aviation in every country of the world.

Now take any other form of air work. A name to differentiate all other forms of commercial aviation from air transport is yet to be coined, but for the sake of a better one let us use "aerial service." Under this general head may be grouped almost every other form of non-military aerial activity, and when this is done it will be seen how differently the application of regulatory provisions should be applied. First, of course, in this classification is the fixed base operator with his flying field hangar, flying equipment, and repair shops. Usually, this type of operator has built his business up from small beginnings. His flying activities range from the three dollar hop to taxi service; they include photographic work, advertising, and the various and miscellaneous services that the airplane has been found useful for. The Gipsy flyer also comes under the aerial service grouping. Of late, he has found that he could maintain a fixed base. Likewise, the private owner may be classed as a possible aerial service factor, for the temptation to use aircraft for profitable uses will become more and more inviting. The aerial surveyors, photographers, dusters, sky writers and all the other specialists complete the list of aerial service group. The capital required by the units of this classification may range from a few hundred dollars to many thousands and the ground service requirements vary with each activity. In no case does the investment required compare in amount with that of air transport. The financial success of this group has in almost every case been demonstrated. One has only to go to cities in the middle West to see all kinds of aerial service flourishing. But what is more remarkable and significant is the fact that this is the only country that can show any of these air activities. Careful inquiry abroad shows that the utilization of aircraft there, is almost exclusively devoted to air transport, aerial service playing practically no part in the life of Europe.

Now what does this have to do with air regulation? In the first place gross misrepresentation has unconsciously been made to the public. It has been stated that this country is far behind Europe in "commercial aviation," using this term to mean air transport, but no praise has been given the aerial service part of the development. In fact, this work whenever it has been mentioned, has been belittled and defamed as the cause of a major part of all accidents. The United States not only leads the world in aerial service but it is probable that there are three times as many planes in use in this country doing this work than there are planes used for air transport in all of Europe. But even more important is the fact that practically all the aerial service people have been and are making money while there has never been a European air transport company operate at a profit, at least to our knowledge, and we have been most anxious to learn of one such case. Now comes the demand for regulation, based on European experience. The fallacy that we are far behind in "commercial aviation" is being used to bring about a form of regulation that may do to aerial service in this country what it has done in Europe, wipe it out. The kind of regulation that is needed for air transport is entirely unsuited for aerial service. One is of national scope; the other local. The purpose of this letter is to try to warn those engaged in aerial service before it is too late. They should organize and see that they are not overlooked. AVIATION cannot take the lead in this movement but it can, as an interested party, try to put the case as clearly as possible. Even the adoption of the name "aerial service" by those not engaged in air transport would do much to clear up the confusion.

It is not the opinion of the best informed persons that there is any intentional desire on the part of anyone to intentionally deceive or put the smaller operators out of business. It is largely due to the misconception of the two totally different fields the air transport and aerial service occupy, and the confusion arising from the use of the terms synonomously. America leads the world in aerial service, and it will increase in importance if the regulations do not make the expense of operation so heavy that the profit will be taken out of the business.—L.D.G.

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